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Geological Survey of the State of New York.

PALÆONTOLOGY:

VOL. V. PART II.

PLATES.

CONTAINING FIGURES OF THE

GASTEROPODA, PTEROPODA AND CEPHALOPODA

OF THE

UPPER HELDERBERG, HAMILTON, PORTAGE AND CHEMUNG GROUPS.

BY JAMES HALL,
STATE GEOLOGIST

ALBANY, N. Y.:
CHARLES VAN BENTHUYSEN & SONS.
1879.

S.D.99

PLATE I.

Platyceras (Orthonychia) subrectum.

Page 1.

Fig. 1. View of a small individual entirely destitute of shell.

Fig. 2. The concave or ventral side of a larger flat specimen, showing but little twisting except near the apex.

Platyceras (Orthonychia) dentalium.

Page 2.

Fig. 3. View of an imperfect specimen, showing the spiral form which has consisted of about one entire volution.

Figs. 4–6. Three views of a spirally compressed specimen, showing the minute incurved beak, and longitudinally rigid body, which is cancellated by transverse lines of growth.

Fig. 7. View of an elongate, imperfect specimen, mostly denuded of the shell, but showing the spiral character.

Fig. 8. A more rapidly expanding specimen, preserving the shell on the lower part and showing a deep revolving sulcus.

Platyceras (Orthonychia) concavum.

Page 3.

Figs. 9, 10. Dorsal and ventral views of the type specimen, which is an internal cast, and imperfect at the apex, but shows the spiral form and the deep, somewhat undefined, broad sulcus of the ventral side. Williamsville, N. Y.

Figs. 11, 12. Views of the opposite sides of an individual which is imperfect at the apex, but retains the shell elsewhere, and shows the fine, even, lamellose concentric striæ, crossed by a few faint longitudinal lines, and also the sulcus on the ventral side. Onondaga, N. Y.

Platyceras (Orthonychia) conicum.

Page 3.

Figs. 13, 14. Lateral view and aperture of a broadly expanded specimen. The minute apex has been broken.

Figs. 15, 17. Lateral and upper views of a similar specimen, showing strong plications upon the margin.

Fig. 16. Lateral view of a flattened specimen of somewhat less expanded form.

This and the two preceding specimens are from the Upper Helderberg limestone at Onondaga, N. Y.

Fig. 18. View of a rapidly expanding specimen, with more attenuate apex. From the Hamilton group at Canandaigua Lake, N. Y.

Fig. 19. A small specimen, similar in form to the last, but having a small enrolled apex.

Figs. 20–22. Three views of an individual of highly conical form, with attenuated, subcentral apex, and strongly plicated margin. From the Hamilton group at Bellona, N. Y.

Fig. 23. Lateral view of a narrower conical form, strongly plicated at the margin, and imperfect at the apex. From the Hamilton group at Widder, C. W.

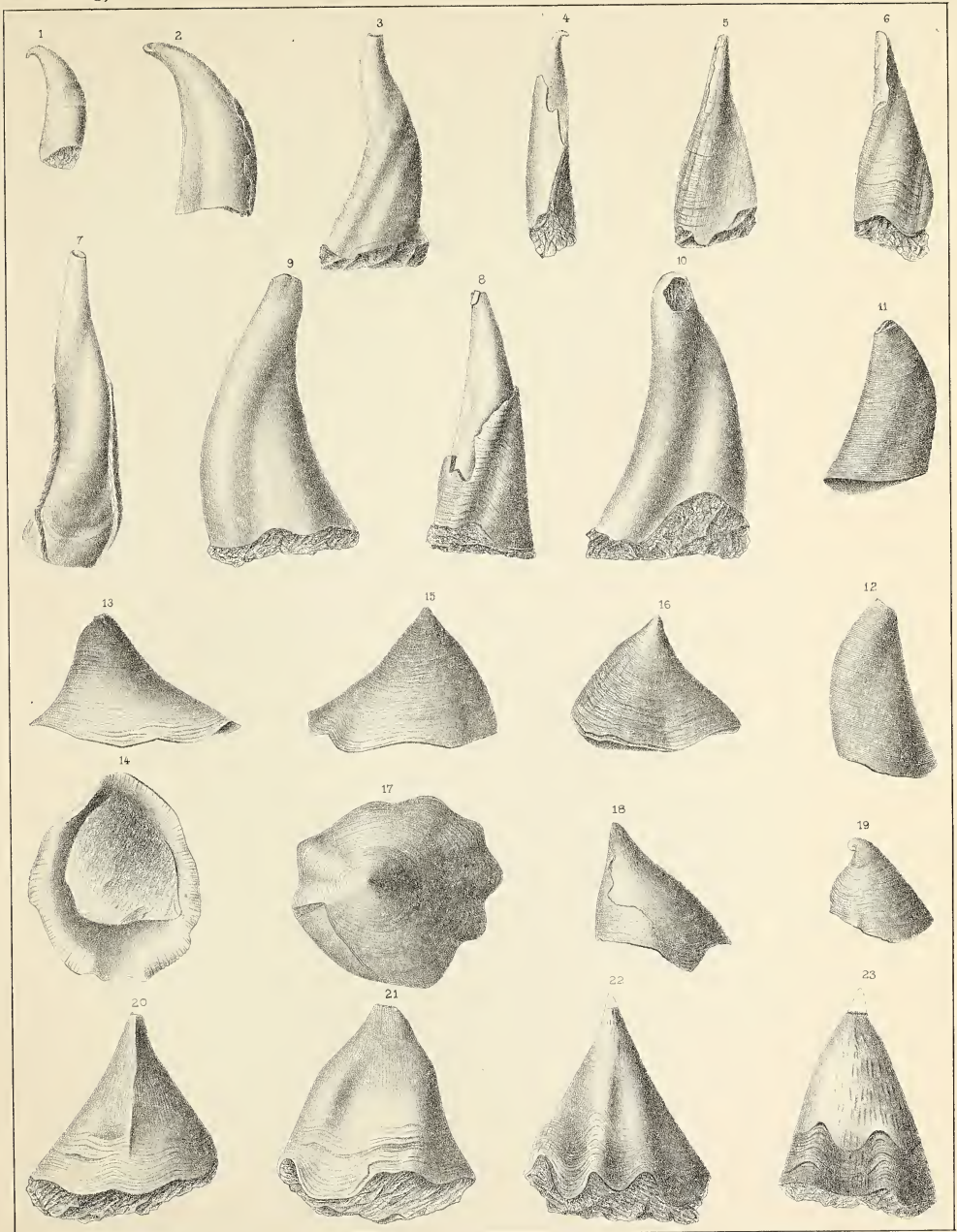
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PLATE II.

Platyceras (Orthonychia) perplexum.

Page 4.

Figs. 1, 2. Views of the opposite sides of a specimen, showing the form and the irregular plications.

Fig. 3. Lateral view of a compressed specimen, imperfect at the apex, showing the plicated surface and concentric striæ.

Platyceras erectum.

Page 5.

Fig. 4. View of the original specimen figured and described in the Fourth District Report. Upper Helderberg limestone, five miles east of Buffalo, N. Y.

Figs. 5, 6. Lateral and dorsal views of a specimen, showing a sudden expansion of the shell at the end of the first volution. From Cayuga, C. W.

Figs. 7, 8. Two views of a specimen, with less closely coiled beak. From the Hamilton group at Pavilion, N. Y.

Figs. 9, 10. Views of the opposite sides of a larger curved specimen. From the Hamilton group at Geneseo, N. Y.

Fig. 11. Lateral view of a small specimen, with closely coiled apex. From the Hamilton group.

Platyceras carinatum.

Page 5.

Figs. 12, 13. Lateral and dorsal views of a small specimen. Upper Helderberg limestone, Helderberg mountains.

Figs. 14–16. Three views of a specimen. From near Williamsville, N. Y.

Figs. 17–19. A large internal cast, showing several plications on the right side. From the Upper Helderberg group, Sandusky, Ohio.

Figs. 20, 21. Two views of a specimen. From the Hamilton group at Canandaigua Lake, N. Y.

Figs. 22–25. Views of a very perfect specimen, from the same locality as the preceding.

Fig. 26. Posterior profile view of a large individual, showing an elevated obtuse carination along the back of the shell. From Bellona, N. Y.

Fig. 27. Lateral view of the same, showing plications on the left side, with the sinuosities and projections of the margin indicated by the direction of the surface striæ.

Figs. 28, 29. Dorsal and lateral views of an internal cast, showing decided lobations on each side of the shell, and the carination in the center. Helderberg mountains, N. Y.

Platyceras conicum.

Page 3.

Figs. 30, 31. Lateral and upper views of an extremely carinate individual, with a regularly arcuate obtusely pointed apex. From Onondaga county, N. Y. (Reference to these figures is omitted in the text.)

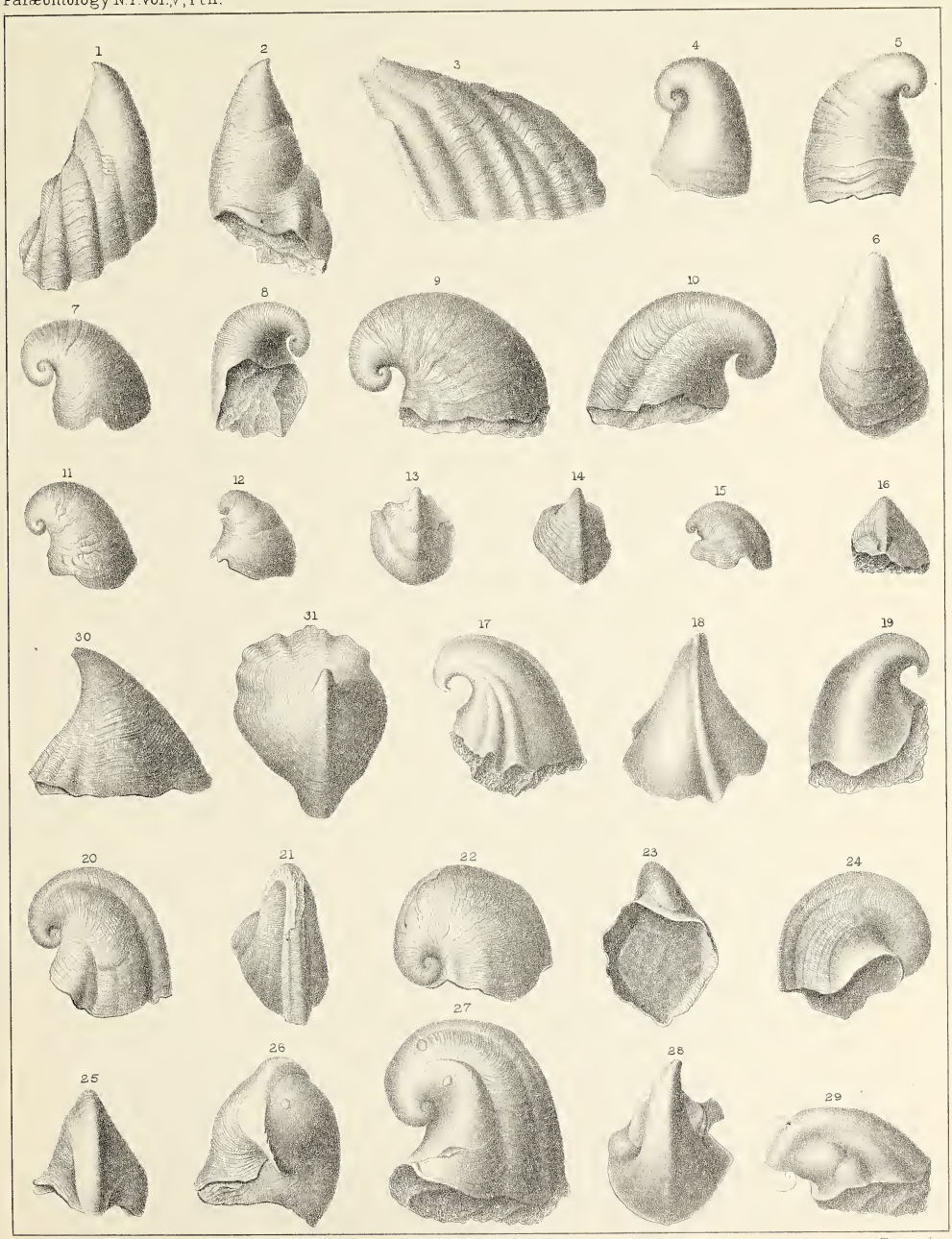
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PLATE III.

Platyceras (Orthonychia) attenuatum.

Page 6.

Fig. 1. Dorsal view of a small specimen which has been laterally compressed.
Figs. 2, 3. Dorsal and lateral views of a more expanded specimen, showing strong folds near the margin.
Fig. 4. Lateral view of the specimen fig. 1, showing the folds of the margin.
Figs. 5, 6. Lateral and dorsal views of an unusually expanded specimen, showing irregular pustulose ridges on the surface of the expanded portion.

Platyceras bucculentum.

Page 10.

Fig. 7. Lateral view of a specimen which may be the young of *P. bucculentum*, but has the appearance of an adult shell. From Canandaigua Lake, N. Y.

Platyceras auriculatum.

Page 7.

Figs. 8–10. Dorsal, right and left views of a specimen, showing the form of the shell and the lateral expansion, with its ridges. Darien, N. Y.

Platyceras Thetis.

Page 8.

Figs. 11, 12. Left and right lateral views of a small specimen, showing the narrow form and enrolled beak.
Figs. 13, 14. Left and right lateral views of an unusually large specimen, showing a more strongly arcuate form.
Figs. 15, 16. Left views of two specimens of large size, showing some variation in form. From the Hamilton group at Canandaigua Lake and Bellona, N. Y.

Platyceras symmetricum.

Page 9.

Fig. 17. Lateral view of a large specimen, referred with some doubt to this species. From the Hamilton group, Canandaigua Lake, N. Y.
Figs. 18–21. Four views of one of the typical specimens exhibiting the general features of the species. Fig. 20 shows the symmetrically coiled beak. Fig. 21 is accidentally compressed on one side. From Canandaigua Lake, N. Y.
Figs. 22–24. Three views of a specimen, showing a loosely coiled beak (except at the apex) and strongly plicated margin.
Fig. 25. Dorsal view of a specimen, showing a strong anterior fold. From Canandaigua Lake, N. Y.

Platyceras bucculentum.

Page 10.

Fig. 26. Lateral view of a specimen, showing the folds of the shell on the left side.
Fig. 27. Dorsal view of an individual, showing the strong lateral folds.
Fig. 28. Dorsal view of the specimen fig. 26.
Fig. 29. The aperture of a large symmetrical specimen, showing a fold in the posterior margin. Livingston county and at Canandaigua Lake, N. Y.

Platyceras Thetis? var. subspinosum.

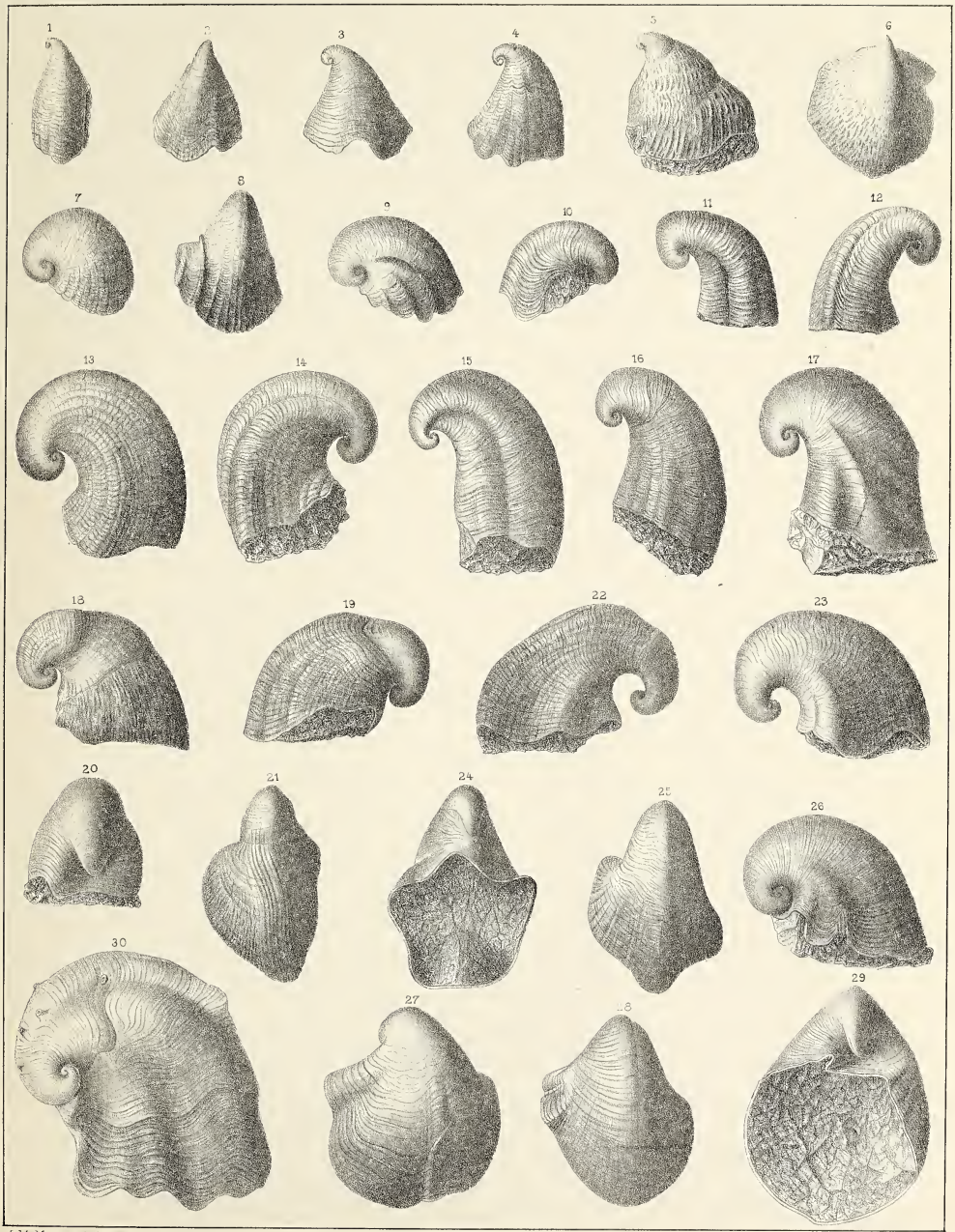
Page 9.

Fig. 30. View of a large flattened specimen, possessing many of the features of *P. Thetis*, but more robust and with the aperture contracted on the right side and strongly plicated. There are a few short spines at the summit of the volution. From the Hamilton group at Canandaigua Lake, N. Y.

HAMILTON GROUP.

(PLATYCERIDÆ .)

Palæontology N.Y.Vol V. Plate III.



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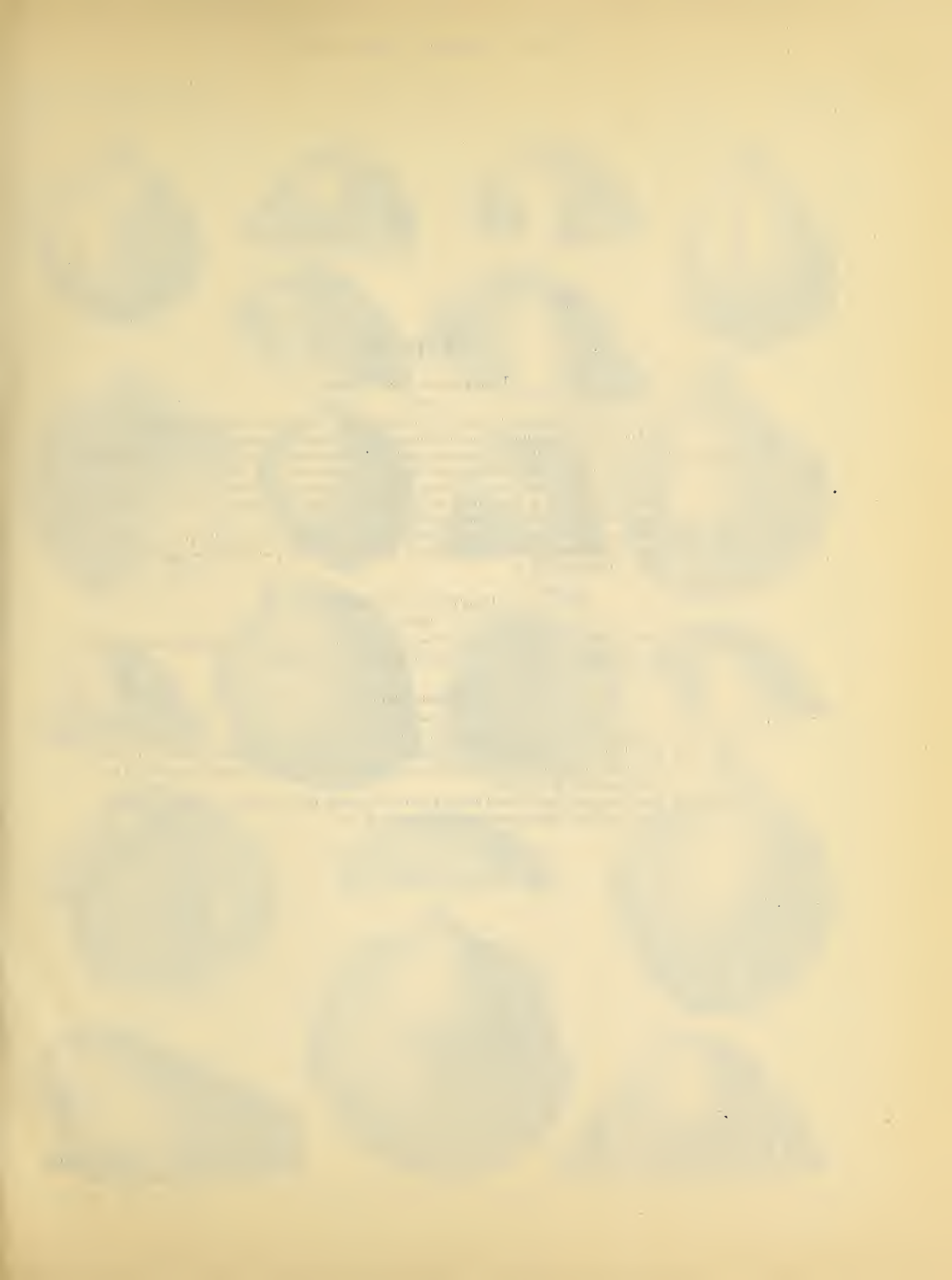

PLATE IV.

Platyceras fornicatum.

Page 11.

Figs. 1–3. Dorsal, posterior and lateral views of one of the typical specimens, showing the strong ridge or fold of the left side and the bases of strong spines. Schoharie county, N. Y.

Figs. 4, 5. Dorsal and lateral views of a specimen partly denuded of shell, showing a more pointed beak, less distinct carina and more numerous spines. Williamsville, N. Y.

Figs. 7, 8. The aperture and upper side of a large specimen, similar in character to fig. 1; somewhat crushed, but with a deep strong notch or sinus in the lip, corresponding to the carina, imperfectly seen in fig. 7. Onondaga, N. Y.

Figs. 18–20. Three views of a large individual, having the features of figs. 12–14, in the younger stages of growth, but becoming more expanded with age. The surface preserves a few scattered spine-bases. Onondaga, N. Y.

Platyceras cymbium.

Page 12.

Figs. 9–11. Lateral, dorsal and posterior views of the typical specimen. This specimen is destitute of shell, except beneath the beak, and does not show the surface characters.

Platyceras rictum.

Page 13.

Fig. 6. View of the aperture of a convex individual. Onondaga, N. Y.

Figs. 12–14. Dorsal, posterior and lateral views of the typical specimen. This is entirely destitute of shell, but retains the imprint of surface markings on most parts. From the Hamilton group at Canandaigua Lake, N. Y.

Figs. 15–17. Dorsal, apertural and lateral views of a very depressed form, showing the surface markings. From the Upper Helderberg group, Onondaga, N. Y.

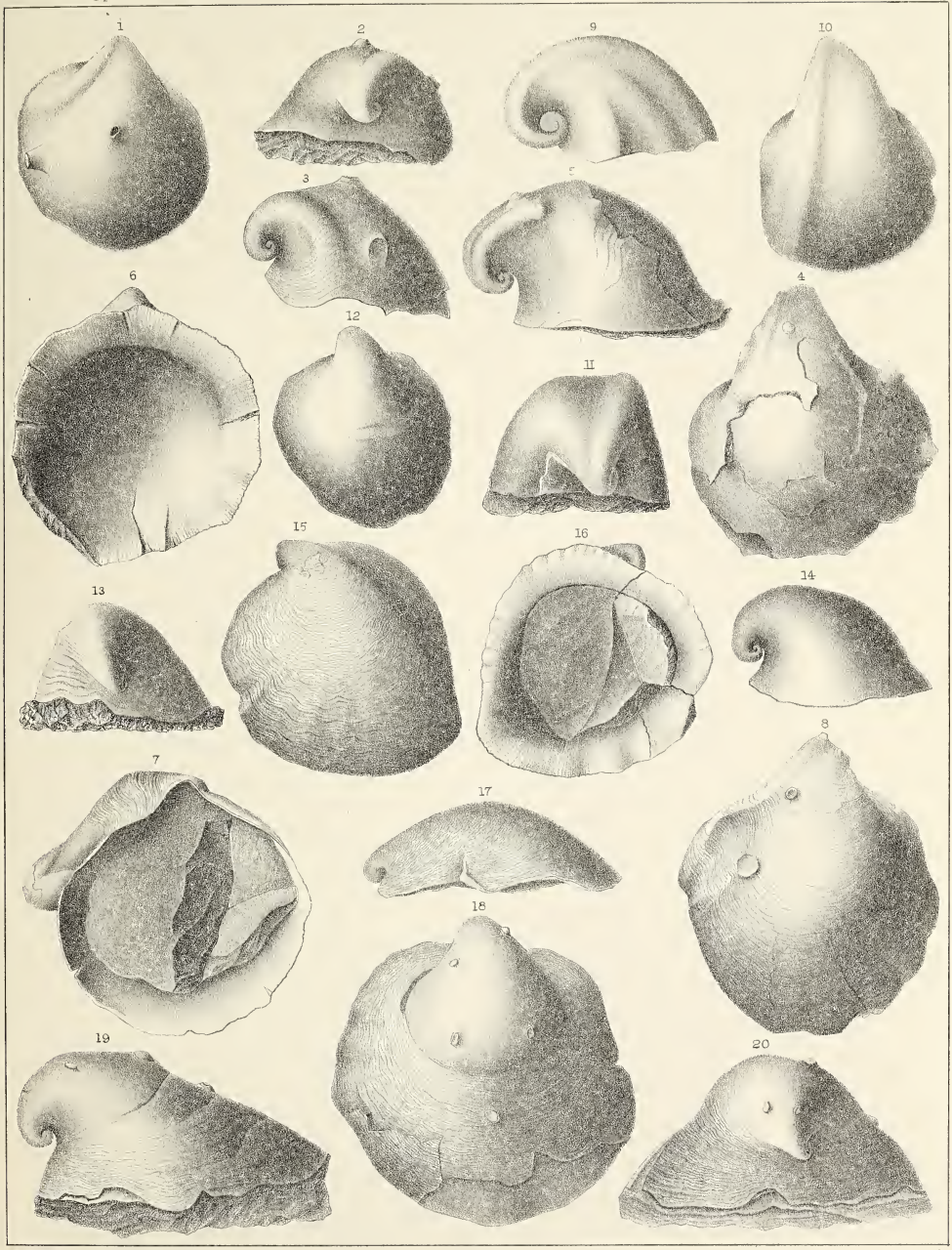
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PLATE V.

Platyceras echinatum.

Page 13.

Figs. 1, 2. Dorsal and lateral views of a small specimen, enlarged to twice the natural size, showing the characters of surface when exfoliated, leaving only the spine-bases remaining. From the Hamilton group at Ludlowville, Cayuga Lake, N. Y.

Figs. 3, 4. Dorsal and lateral views, natural size, of a specimen denuded of the exterior shell and showing the bases of the spines as tubercles. From the Tully limestone at Ovid, N. Y.

Platyceras dumosum var. rarispinum.

Page 16.

Fig. 5. Lateral view of a small specimen, showing a few scattered spines. Oneida county, N. Y.

Figs. 6, 7. Lateral and dorsal views of a larger specimen, similar in character to the preceding. Darien, N. Y.

Fig. 10. Oblique side view of a specimen which is partly imbedded in rock, and preserves several of the spines in place. Schoharie, N. Y.

Platyceras fornicatum var. contractum.

Page 12.

Figs. 8, 9. Two views of the specimen referred to as a variety in the original description of *P. fornicatum*.

Platyceras dumosum, *Conrad.*

Page 14.

Fig. 11. View of a small specimen preserving several spines and spine-bases. Falls of the Ohio.

Fig. 12. View of a larger and more robust specimen, partially imbedded in the rock, and showing numerous spine-bases. Schoharie, N. Y.

Fig. 13. View of a specimen with a large number of broken and displaced spines. From the Corniferous limestone near Columbus, Ohio.

Figs. 14, 15. Two views of a large ventricose individual (the type specimen used by Mr. Conrad for description), showing the bases of hollow spines, covering almost the entire surface. Schoharie, N. Y.

Fig. 16. The aperture of a long slender specimen, similar to figs. 11 and 12. The surface shows numerous spine-bases, and a plicated margin. Helderberg mountains, N. Y.

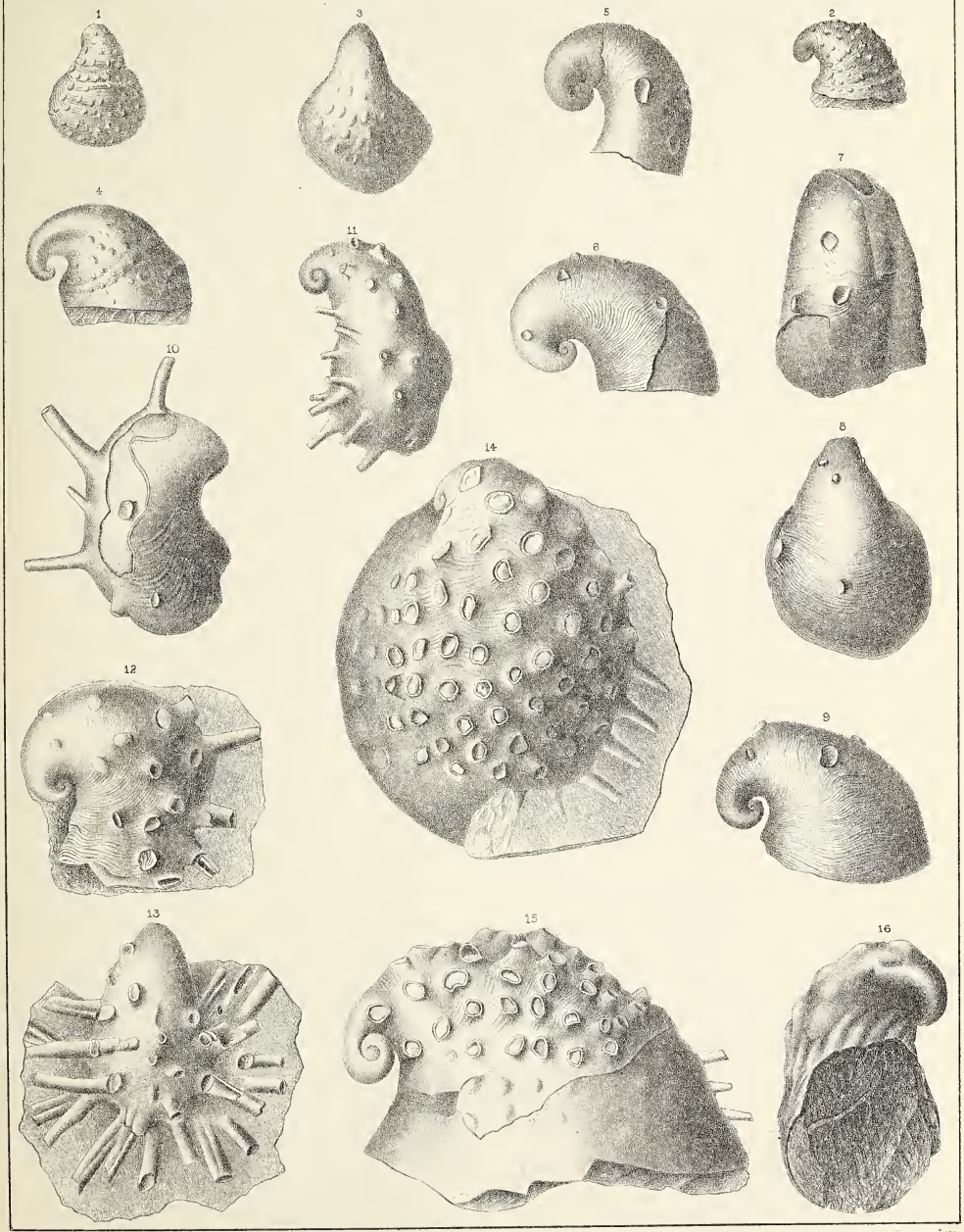
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PLATE VI.

PLATYCERAS DUMOSUM, *Conrad.*

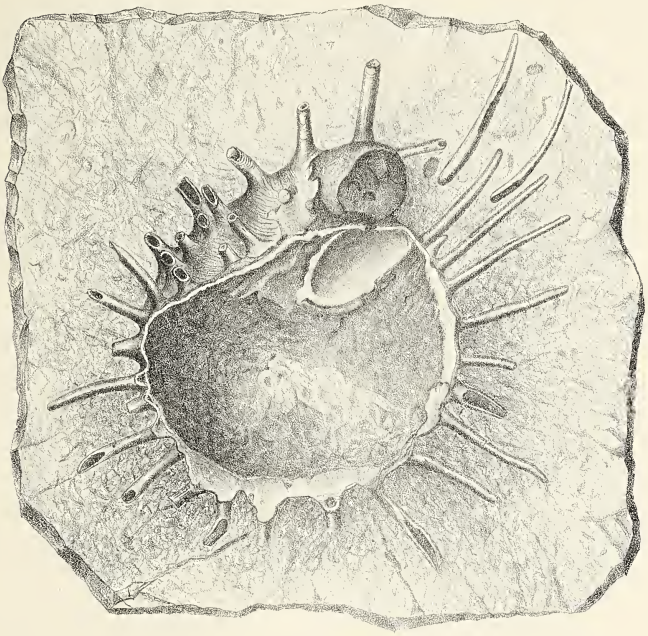
Page 14.

Fig. 1. View of a large ventricose specimen imbedded in rock, showing the form of the aperture and the long submarginal spines in place. Schoharie, N. Y.

PLATYCERAS MULTISPINOSUM, *Meek.*

Page 15.

Figs. 2, 3. Ventral and lateral views of a specimen communicated by Dr. J. S. Newberry for comparison with *P. dumosum.*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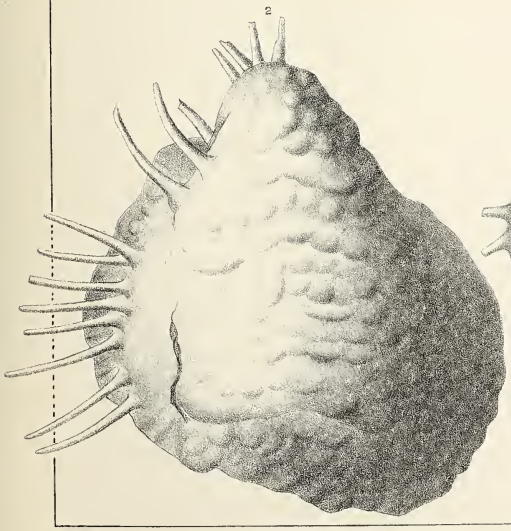
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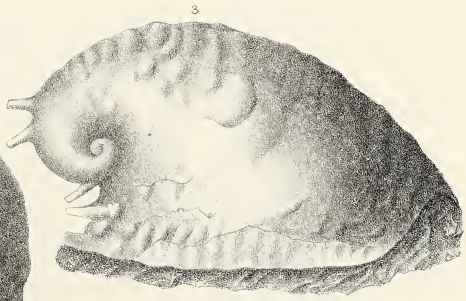
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PLATE VII.

PLATYCERAS UNDATUM.

Page 17.

Figs. 1, 2. Views of the opposite sides of an internal cast, showing transverse lines of broad tubercles, and giving the general form of the shell. The original shell has doubtless been marked by strong spines.

PLATYCERAS DUMOSUM, *Conrad.*

Page 14.

Fig. 3. Dorsal view of the specimen represented on Plate V, fig. 16.

PLATYCERAS NODOSUM.

Page 17.

Figs. 4, 5. Lateral and dorsal views of an internal cast, showing very strong tubercles, indicating spine-bases in a somewhat quincunx arrangement.

PLATYCERAS CRASSUM.

Page 18.

Fig. 6. View of an internal cast which is probably of this species. Schoharie, N. Y.

Fig. 7. A somewhat smaller individual which is more expanded toward the aperture, partially from compression. Clarksville, Albany county, N. Y.

Figs. 8-10. Three views of the typical specimen which is a partial cast and shows great thickness of shell. Helderberg mountains, N. Y.

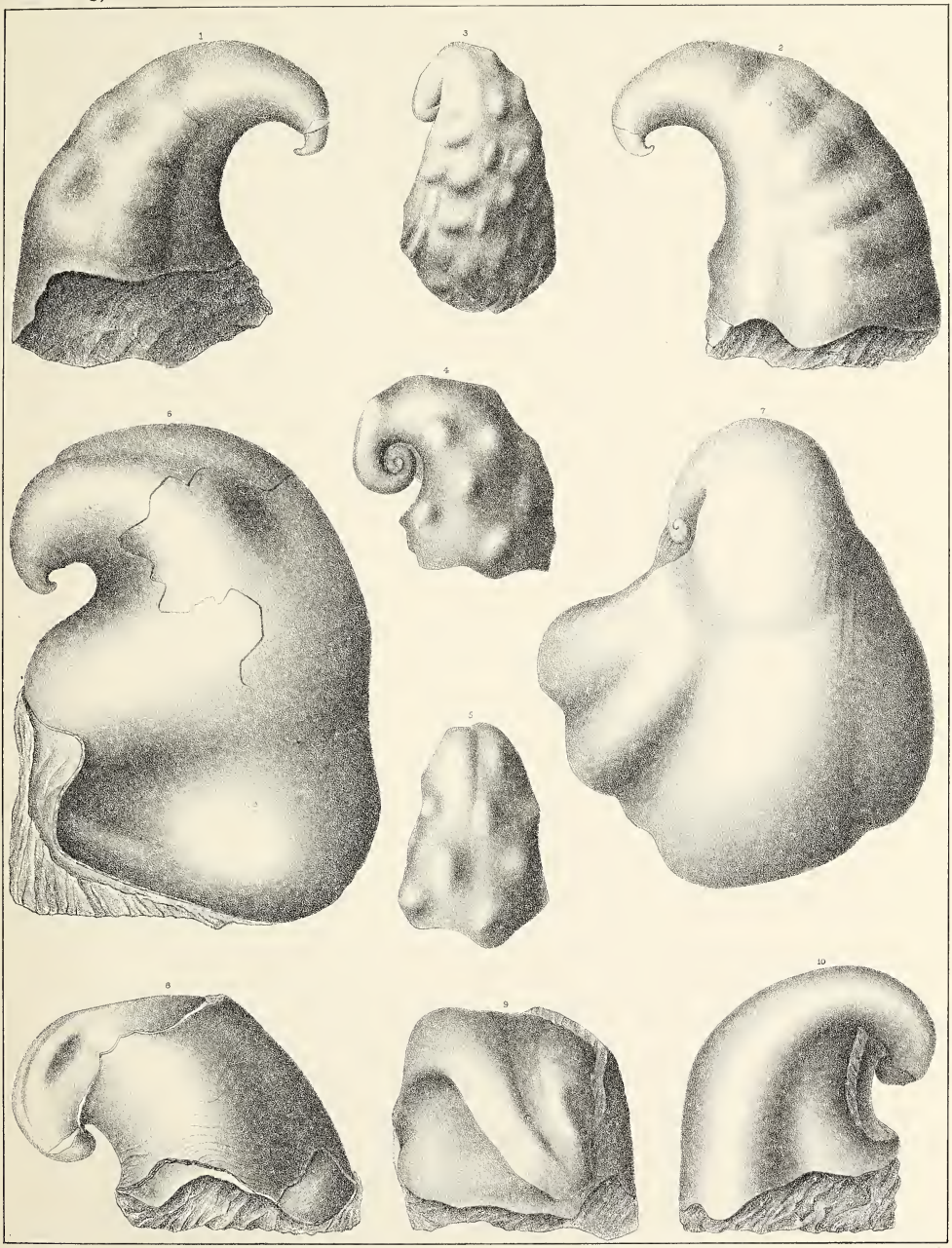
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PLATE VIII.

Platyceras Argo.

Page 19.

Figs. 1–3. Three views of the originally described specimen; a partial internal cast, retaining the impressions of the concentric undulations of the surface.

Fig. 4. View of the right side of a specimen, partially exfoliated. Along the middle can be traced the remains of a deep notch which existed in the lip, now forming an elevated ridge somewhat obscured by adhering rock.

Fig. 5. View of the opposite side of the specimen represented in fig. 4.

Fig. 6. Ventral view of the same, showing the depth of the shell, and the sinistrally coiled volutions.

Platyceras Ammon.

Page 20.

Fig. 7. View of an individual of medium size, showing the strong volutions and the peculiar lamellose structure. Port Colborne, Canada.

Figs. 8, 9. Views of the opposite sides of a large individual, showing the general form of the shell. Darien, N. Y.

Fig. 10. Ventral view of the specimen figs. 8 and 9, showing the enrolling of the beak which in the figure is represented as too nearly on the same plane; it is directed more upwards, leaving a greater depth of the outer volution on the lower side.

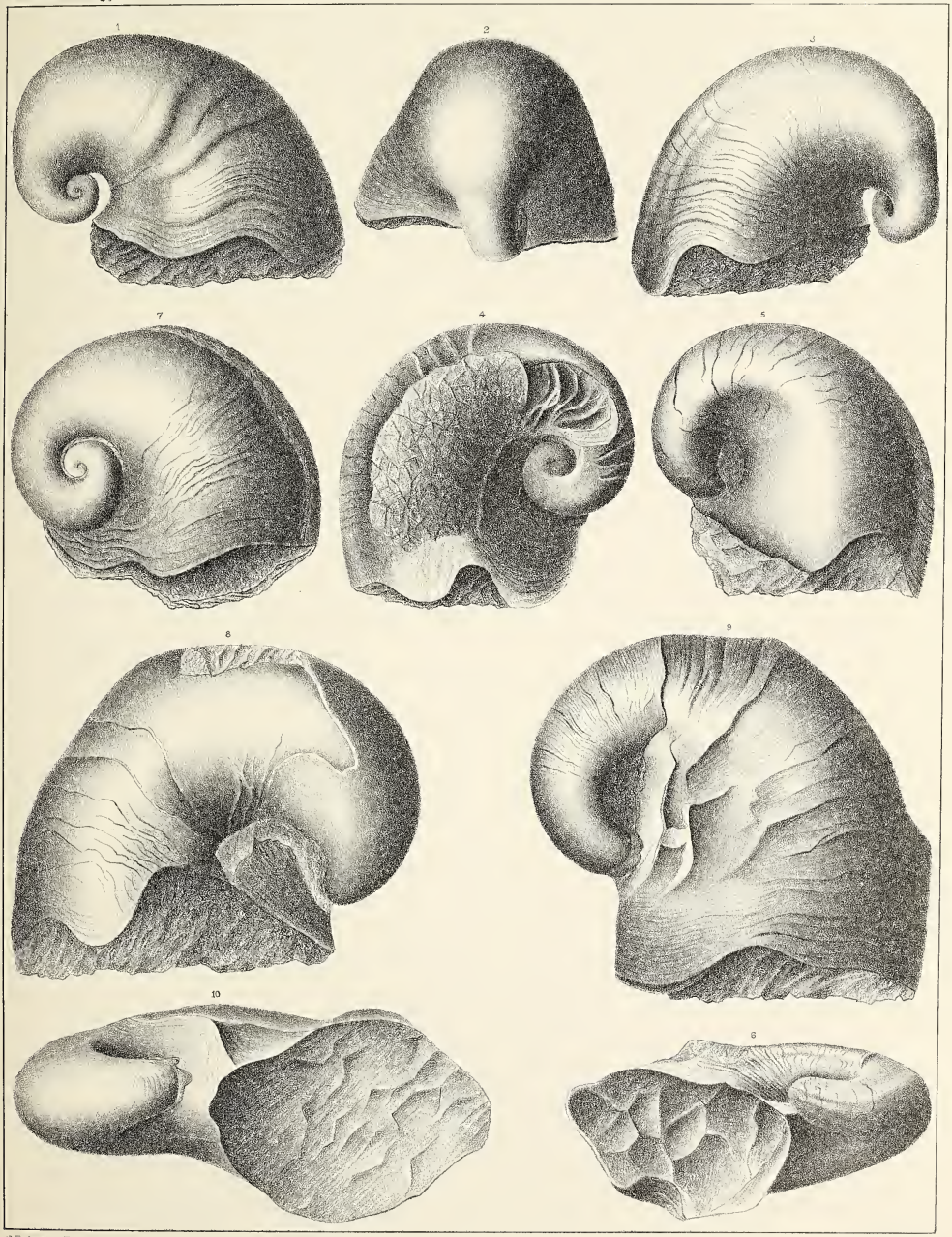
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PLATE IX.

PLATYOSTOMA TURBINATA var. COCHLEATA.

Page 28.

Figs. 1, 2. The opposite sides of an irregularly coiled specimen, showing a moderately elevated spire.

Fig. 3. The aperture of an individual, with more elevated spire and narrower form. The lower side of the last volution shows a depressed line marking the position of a notch in the outer lip. The specimen is slightly umbilicate.

Fig. 4. Enlargement of the striæ where crossing the line of the notch in the outer volution.

Fig. 5. Apertural view of a specimen having a line indicating a notch in a higher position on the volution than the preceding, only visible on the outer volution and obsolete at the lip. The inner lip of the aperture is disunited from the columella.

Fig. 6. An individual with the outer volution disunited and much contracted near the aperture.

Fig. 7. Dorsal view of the same specimen.

Fig. 8. A larger individual, showing a double sinuosity in the outer lip.

Figs. 9–11. A still larger specimen, having an indistinct band bordering the suture.

PLATYOSTOMA TURBINATA.

Page 27.

Figs. 12, 13. Two views of a young individual with a nearly flattened spire.

Figs. 14, 15. A larger specimen of similar character, with a depressed spire and a broad, shallow sinuosity in the lip.

Figs. 16, 17. Two views of a still larger specimen, with the spires somewhat depressed below the outer volution, and the depression bordered in part by a sulcated band, indicating a slit in the aperture at that stage of growth.

Figs. 18, 19. A similar specimen accidently compressed and shortened, and showing the center of the sinuosity marked by a projecting point on the lip.

Figs. 20, 21. Two views of the specimen from which the species was originally described.

Fig. 22. An apertural view of a specimen differing somewhat in the form of the columella and aperture and also in the height of the spire.

Figs. 23, 24. A large individual, ridged and plicated on the outer volution.

PLATYOSTOMA UNISULCATA.

Page 26.

Figs. 25, 26. Two views of the original specimen, from which Mr. Conrad's description was taken.

PLATYOSTOMA TURBINATA var.

Page 29.

Fig. 27. The aperture of a young individual bearing considerable resemblance to *P. turbinata* var. *cochleata*.

Figs. 28–30. A characteristic full-grown specimen of this variety.

PLATYOSTOMA PLEUROTOMA.

Page 30.

Figs. 31–33. Three views of a specimen of this species.

Fig. 34. The aperture of a large individual, showing the twisting of the columella and the form of the shell.

Fig. 35. Partial side view, showing more distinctly the twisting of the columellar lip.*

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* The columellar lip in these individuals resembles that of Strophostylus, while the surface characters and form of volution are clearly characteristic of Platyostoma.

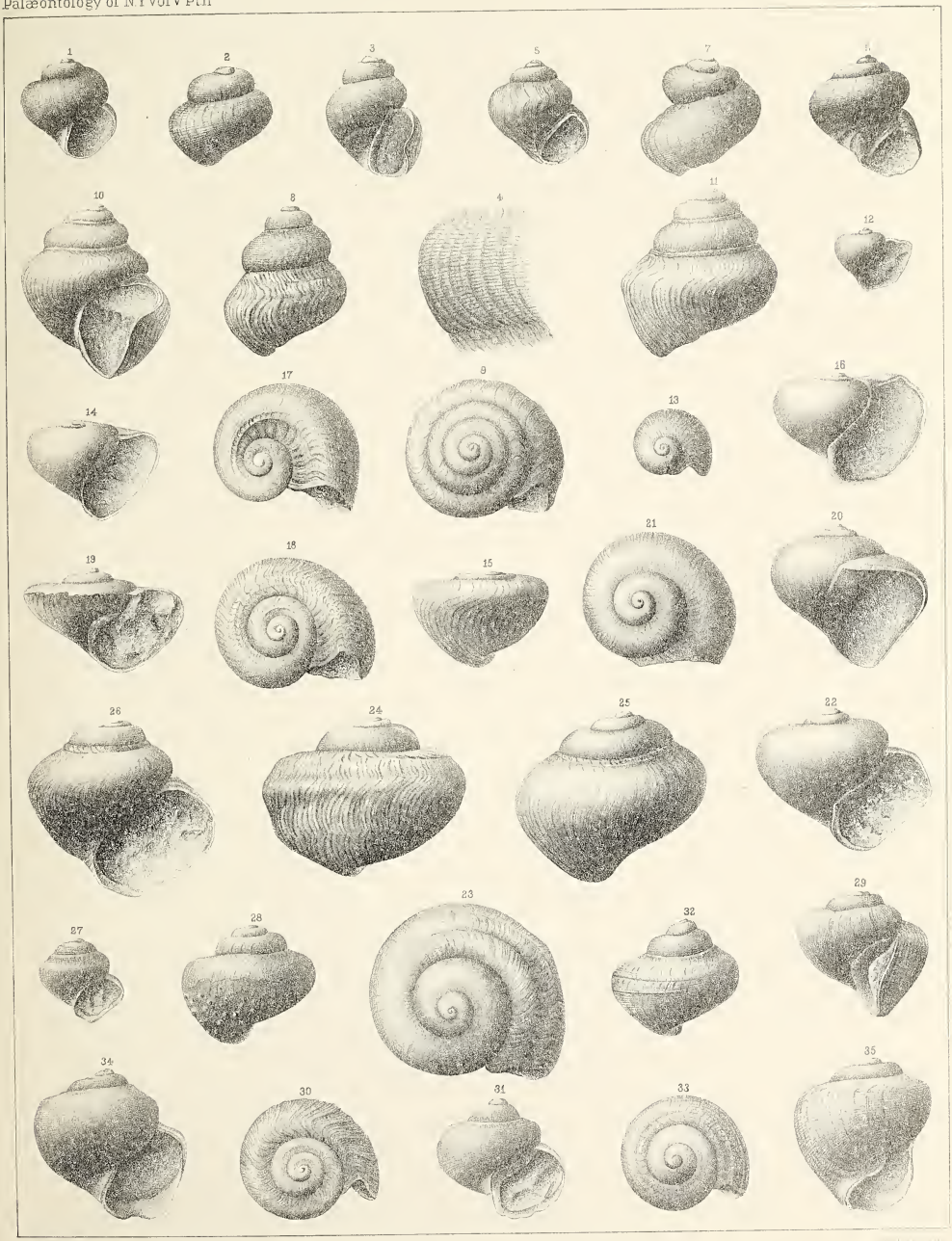
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PLATE X.

PLATYOSTOMA LINEATA.

Page 21.

Fig. 1. A small patulose specimen. From the Upper Helderberg group, Onondaga county.

Fig. 2. The aperture and spire of a symmetrical specimen, having the normal characters of the species.

Figs. 3, 4. Summit of the spire and lateral view of the specimen fig. 2.

Figs. 5, 6. The spire and aperture of a larger specimen, differing from the preceding in the curving of the columella.

Fig. 7. The spire of a specimen of medium size, which, during a part of its growth, has possessed a slit in the outer lip, occurring, apparently, from some accidental cause, at the commencement of the outer volution, and afterwards becoming closed, has left the surface plicated and irregular. Upper Helderberg group, Schoharie, N. Y.

Fig. 8. The spire of a large individual of the ordinary form of the species, as it occurs in the limestone.

Fig. 9. A similar view of a more robust individual.

Fig. 10. Lateral view of the outer volution of a specimen similar to figure 9.

These specimens, with two exceptions, are from the Upper Helderberg limestone at Williamsville, N. Y.; they preserve, in a well-marked manner, the concentric and radiating striæ.

Fig. 11. The spire of a specimen somewhat similar to fig. 7.

Fig. 12. Enlargement of the surface striæ of the same. Hamilton shales, near Geneseo, N. Y.

Figs. 13, 14. Two views of a specimen, preserving the surface in great perfection. The specimen is slightly depressed from accidental causes. From the Hamilton shales, Canandaigua Lake.

Fig. 15. Enlargement of the surface of the preceding.

Figs. 16–18. Three views of a large specimen, preserving the form of the aperture and peristome. The aperture is slightly rhomboidal, varying somewhat from the prevailing type. From the Hamilton shales at Canandaigua Lake.

Fig. 19. An unusually large individual, which preserves the striæ of growth very distinctly, while the concentric striæ are obsolete. Corniferous limestone, Darien, N. Y.

Figs. 20, 21. Two views of an internal cast of the same species. Chemung group.

PLATYOSTOMA LINEATA var. CALLOSA.

Page 23.

Fig. 22. The aperture of a specimen which has the appearance of *P. lineata*, but with a thickened callus on the inner lip.

Fig. 23. The spire of the same specimen.

PLATYOSTOMA DEFIGURATA.

Page 24.

Fig. 24. The apertural side of the specimen of which the outer volution has been crushed.

PLATYOSTOMA LINEATA var. AMPLA.

Page 23.

Fig. 25. The spire.

Fig. 26. The apertural side, showing the great elevation, large aperture and peculiarity of the columella, approaching in character to Strophostylus.

PLATYOSTOMA EUOMPHALOIDES.

Page 25.

Fig. 27. Dorsal view of the specimen. Hamilton group, York, Livingston county, N. Y.

Fig. 28. The base of the specimen, showing the aperture and the columellar lip modified by the preceding volution.

Fig. 29. The spire as seen from above, showing the depressed upper surface of the outer volution.

(JANTHINIDÆ .)

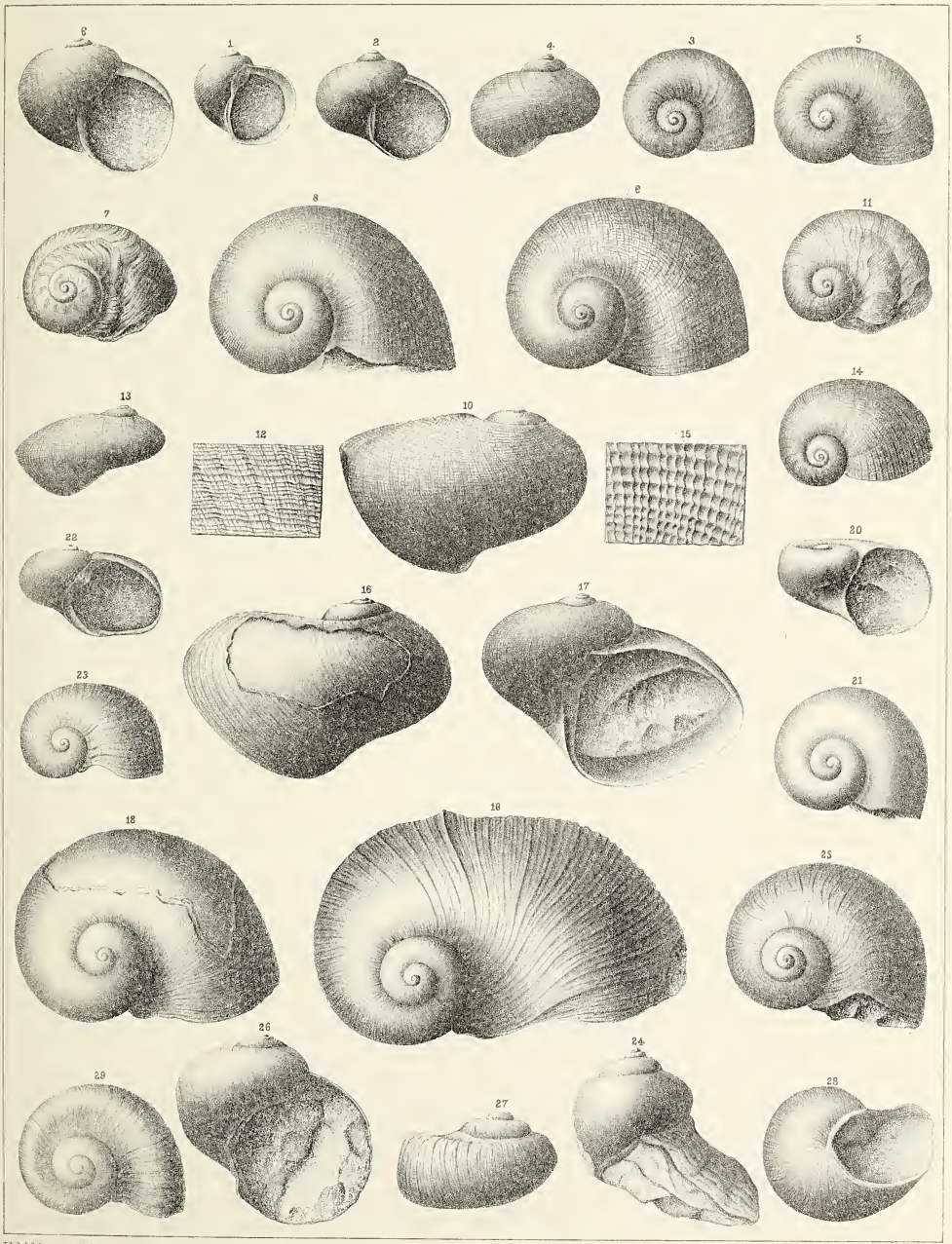


PLATE XI.

Platyostoma unisulcata var.

Page 27.

Fig. 1. Apertural view, showing the general form and elevation of the shell, the columella, etc.
Fig. 2. The back of the same specimen, showing the angularity of the volution.
Fig. 3. The spire.

Platyostoma lineata var. sinuosa.

Page 24.

Fig. 4. Front view of a small specimen with a depressed spire.
Fig. 5. Basal view, showing the deep sinus in the aperture. Hamilton group, Livingston county, N. Y.
Figs. 6, 7. Apertural view and spire of a larger specimen, with much higher spire and rounded volutions. From the Hamilton group, Canandaigua Lake, N. Y.
Fig. 8. Basal view of the same, showing the deep sinus of the lip.

Platyostoma aplata.

Page 26.

Fig. 9. The spire of an imperfect specimen. From the Schoharie grit, Schoharie, N. Y.

Pleurotomaria? sp.?

Naticopsis? cretacea, Hall. Illustrations of Devonian Fossils: Gasteropoda, pl. 11. 1876.
Not *Naticopsis cretacea*, H. & W. Twenty-third Rep. N. Y. State Mus. Nat Hist., p. 240. 1873.
Not *Naticopsis lævis*, Meek. H. & W. Ib. Explanation pl. 12, figs. 3–5.
Fig. 10. The spire of an imperfect cast referred with doubt to this species.
Fig. 11. Front view of the same, showing the obliquity of the shell and the substance of the callus filling the umbilicus. Upper Helderberg limestone near Clarence Hollow, N. Y.
Figs. 12, 13. Two views of an internal cast. Upper Helderberg limestone near Columbus, Ohio.

Strophostylus unicus.

Page 30.

Fig. 14. Front view of the typical specimen, showing the columella and the form of the shell.
Fig. 15. Summit view of the same specimen. From the Schoharie grit, Schoharie, N. Y.

Strophostylus varians.

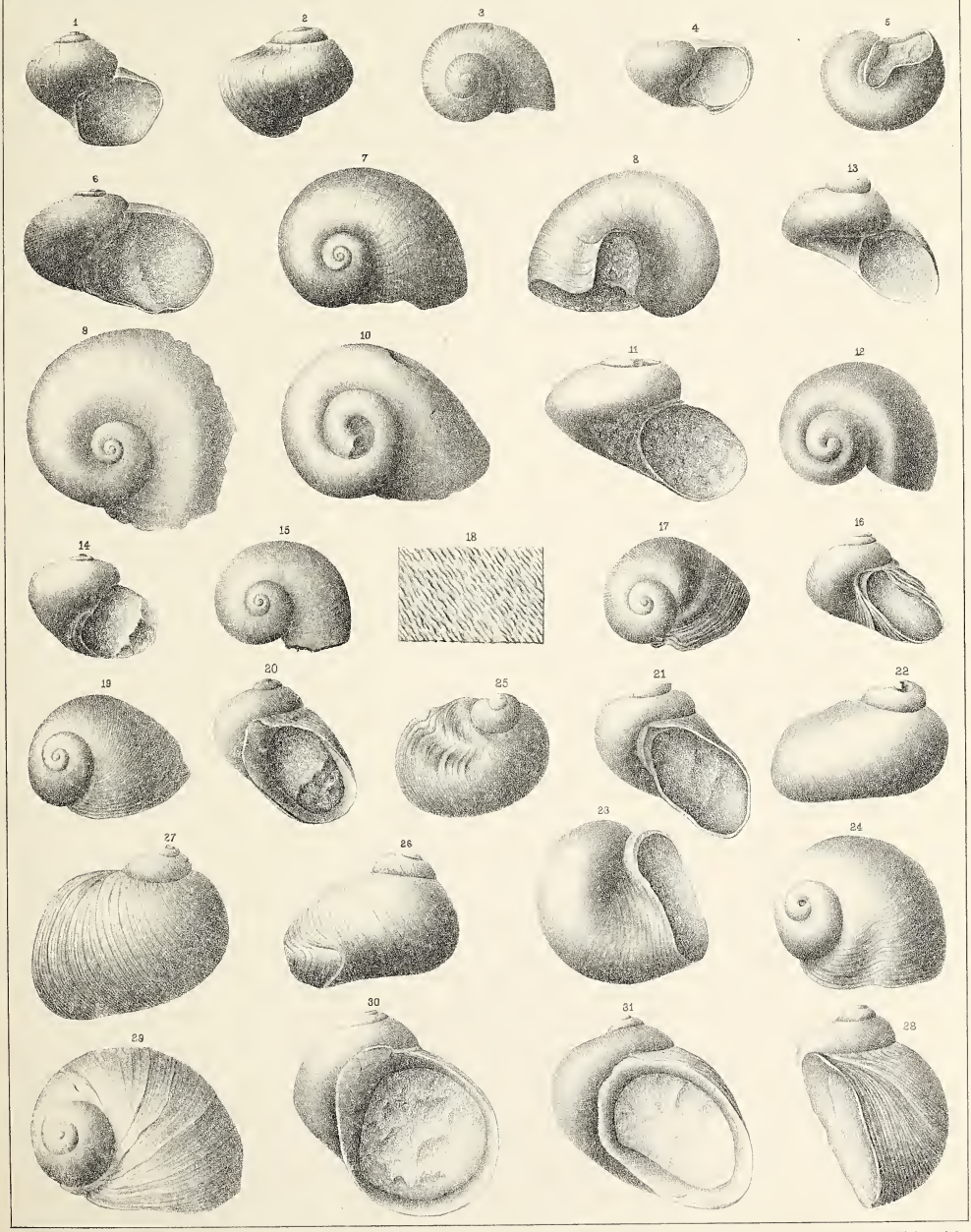
Page 31.

Figs. 16, 17. Two views of a young, very oblique specimen, showing, in fig. 16, the peristome nearly detached from the body of the preceding volution—an exceptional feature.
Fig. 18. Enlargement of the surface striæ from a small, well-preserved specimen.
Figs. 19, 20. Two views of a larger specimen, showing the peristome more completely united to the preceding volution.
Fig. 21. A medium-sized specimen, showing very great obliquity of the last volution and a slight separation of the peristome from the body-whorl.
Figs. 22–24. Other examples, showing the form of the shell and the very broad umbilicus.
Fig. 25. A small specimen, showing strong plications near the aperture, indicating the existence of a notch in the peristome during the later period of its growth.
Fig. 26. A large and more rotund specimen, showing an injury to the peristome during growth.
Figs. 27, 28. Two views of a large, well-formed, rotund specimen. The second figure shows the obliquity of the outer lip to the axis of the shell.
Figs. 29, 30. Two views of a large specimen, the latter showing the inner lip spreading over the preceding volution.
Fig. 31. A large oblique specimen with the peristome much thickened.
The specimens are all from the Upper Helderberg limestone, Onondaga county, N. Y.

UPPER HELDERBERG GROUP.

(JANTHINIDÆ.)

Palæontology of N.Y.Vol.V.Pt.II. Plate XI



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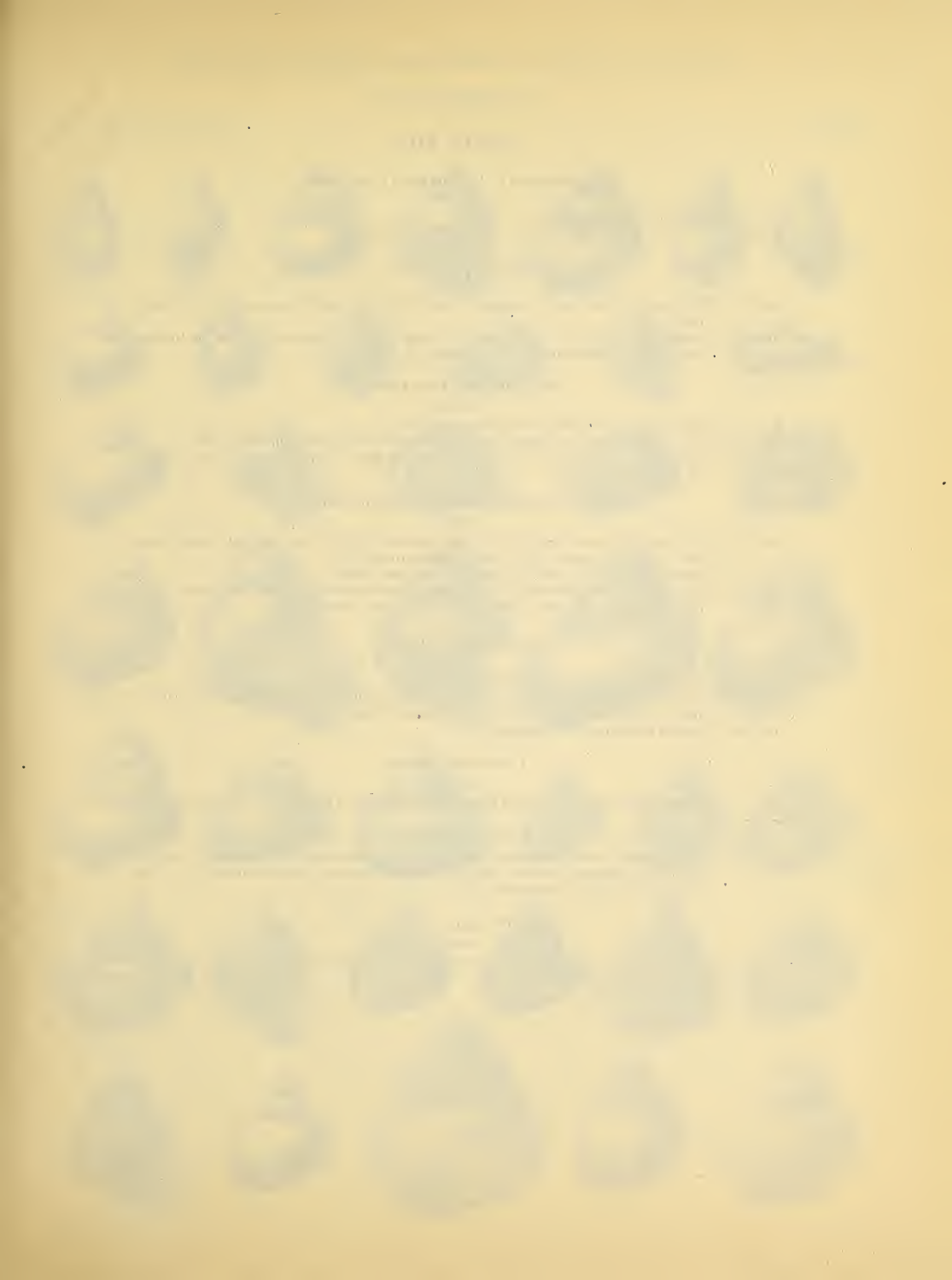

PLATE XII.

Macrocheilus? (Callonema?) primævus.

Page 34.

Fig. 1. Lateral view of an imperfect cast.

Figs. 2, 3. Two views of a larger individual, which is obliquely crushed.

Macrocheilus Hebe.

Page 32.

Figs. 4, 5. Two views of a large individual (natural size). From the Hamilton group, Pavilion, Genesee county, N. Y.

Figs. 6, 7. The opposite sides of the typical specimen enlarged to three diameters. From the Goniatite limestone of the Marcellus shale, near Manlius, N. Y.

Macrocheilus Hamiltoniæ.

Page 33.

Figs. 8, 9. Views of the opposite sides of the typical specimen.

Figs. 10, 11. The opposite sides of an internal cast. From the Hamilton group, Cumberland, Md.

Figs. 12–14. A specimen which has been denuded of the spire and flattened vertically so as to change entirely the character of the shell.

Macrocheilus (Holopea) macrostomus.

Page 33.

Figs. 15, 16. The opposite sides of the typical specimen, showing the form of the shell and surface characters. Hamilton group at Pratts Falls, Onondaga county, N. Y.

Fig. 17. An internal cast, referred to this species. From the same locality.

Fig. 18. A compressed specimen, referred to this species; the spire is more elevated than usual, but the other characters are similar. Hamilton group, Madison county, N. Y.

Callonema Lichas.

Page 52.

Fig. 19. A specimen in which the surface is partially preserved.

Figs. 20, 21. Views of the opposite sides of a larger specimen preserving the substance of the shell on some parts. From the Upper Helderberg limestone near Clarence Hollow, N. Y.

Fig. 22. An internal cast from near Columbus, Ohio.

Cyclonema Doris.

Page 34.

Fig. 23. A specimen of this species preserving the usual form. From the Schoharie grit, Schoharie, N. Y.

Pleurotomaria? sp.?

Fig. 24. A specimen almost entirely denuded of the shell, but retaining impressions of the revolving band on the body-volution. From the Upper Helderberg limestone, Clarence Hollow, N. Y. This form may be a cast of *Pleurotomaria Itys*.

Pleurotomaria capillaria?

Page 77.

Fig. 25. Enlargement of a specimen which is referred with doubt to this species. From the Upper Helderberg limestone, Williamsville, N. Y.

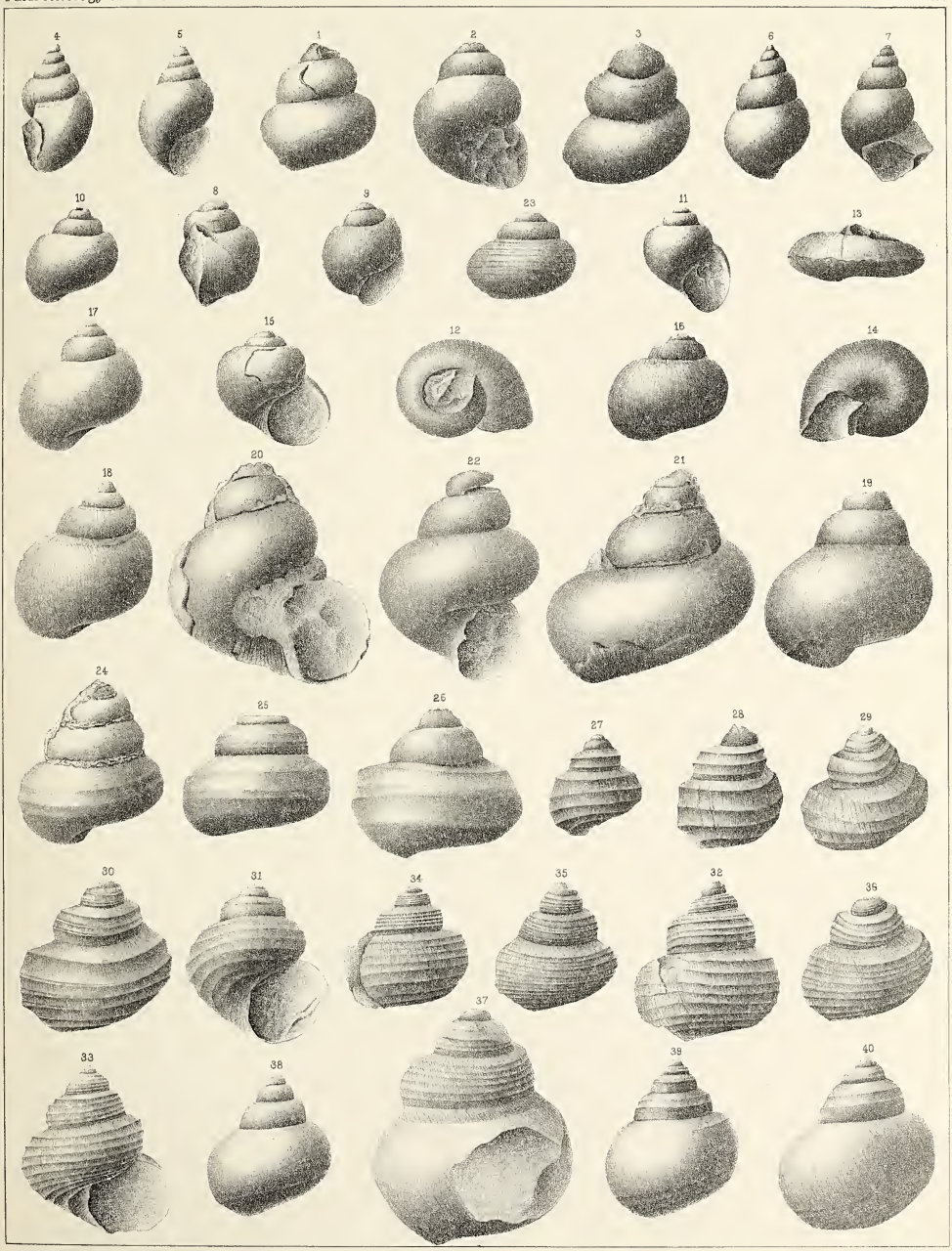
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PLATE XII.—*Continued.*

Cyclonema? (Pleurotomaria?) sp.?

Fig. 26. The back of a cast. From the Hamilton group, near Leonardsville, Madison county, N. Y.

Cyclonema lirata.

Page 35.

Figs. 27–29. Three individuals, differing in size, but with the same character of surface. From the Hamilton group, Schoharie county, N. Y.

Cyclonema multilira.

Page 36.

Figs. 30, 31. The opposite sides of the typical specimen. Hamilton, N. Y.

Figs. 32, 33. Two views of an entire specimen which is somewhat compressed.

Cyclonema Hamiltoniæ.

Page 37.

Fig. 34. A specimen preserving the substance of the shell with the entire surface characters. Pratts Falls, Onondaga county, N. Y.

Fig. 35. A cast showing a greater number of striæ. Schoharie county, N. Y.

Fig. 36. A specimen showing a line on the flattened portion at the top of the last volution. From the same locality.

Cyclonema obsolescens.*

Page 38.

Fig. 37. A large cast showing the revolving carinæ on the upper volutions, but which are scarcely visible on the body-whorl.

Cyclonema concinna.

Page 38.

Fig. 38. An internal cast showing only the upper one of the bands.

Fig. 39. A gutta-percha cast in the natural mold. The specimen shows no carinæ on the body-volution, except that forming the upper angle, and again at the base of the volution.

Fig. 40. Cast of a larger individual, with the entire lower surface of the body-whorl marked by the carinæ, and only two strong ones on the upper volutions.

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* The specific name of *obsoleta*, originally given, is preoccupied.

PLATE XIII.

Loxonema subattenuata.

Page 40.

Fig. 1. An internal cast, consisting of three volutions, but showing no traces of surface characters.
Fig. 2. A similar specimen, consisting of five volutions.
Fig. 3. A similar but larger individual, retaining about five and a half volutions and somewhat compressed.

Loxonema robusta.

Page 40.

Fig. 4. One of the specimens used in the original description. The opposite side (not figured) shows the characteristic markings of the genus Loxonema faintly traceable on the two lower volutions; those on the larger volution are strong, three of them occupying the space of more than an eighth of an inch.
Fig. 5. A larger individual, showing the form, but somewhat compressed. Schoharie, N. Y.
Fig. 6. An imperfect internal cast of this species. Clarence Hollow, N. Y.

Loxonema? coapta.

Page 44.

Fig. 7. An imperfect specimen, in limestone of the Hamilton shales, at Eighteen-Mile creek, Lake Erie shore.

Loxonema solida.

Page 41.

Figs. 8, 9. The typical specimens from which the original description was drawn. They are internal casts, and show no evidence of surface-markings.

Loxonema? teres.

Page 42.

Fig. 10. A cast of the species in limestone, with no defined surface-markings; but the form of the volutions, and the absence of any indication of a revolving band, show its relations with Loxonema.

Loxonema pexata.

Page 42.

Figs. 11, 12. Internal casts of two specimens, which show no external markings; probably of this species. Stafford, Genesee county, N. Y.

Loxonema pexata var. obsoleta.

Page 43.

Fig. 13. The lower volutions, showing the form and the surface-markings, which are more arcuate than represented in the drawing.

Loxonema hydraulica.

Page 44.

Fig. 14. The typical specimen.

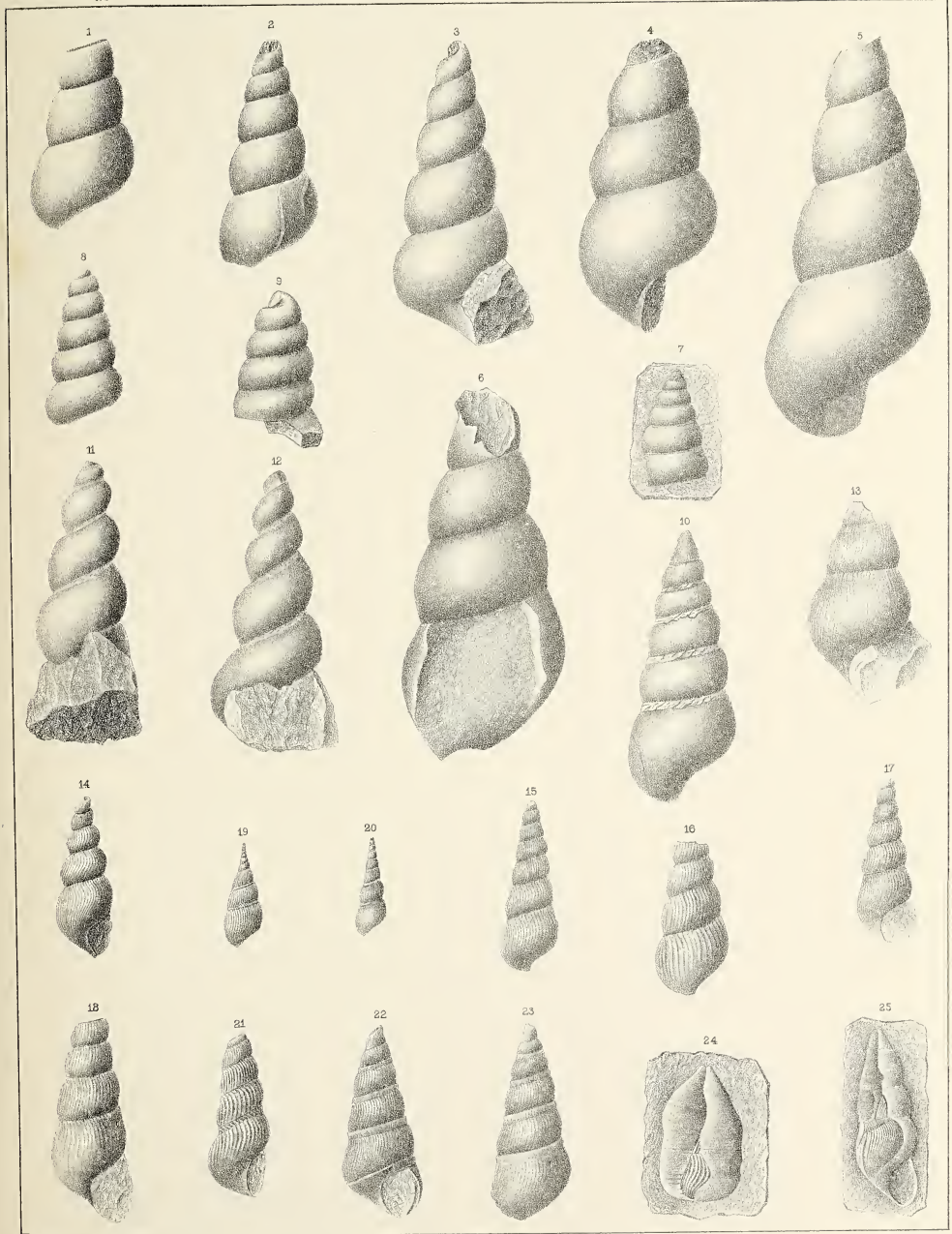
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PLATE XIII.—*Continued.*

Loxonema Hamiltoniæ.

Page 45.

Fig. 15. A specimen of the usual size, showing the characteristic features of the species.

Fig. 17. An individual of similar character, scarcely differing in size, and preserving one volution less than the preceding.

Loxonema pexata.

Page 42.

Fig. 16. A typical specimen of the species. Dublin, Ohio.

Fig. 18. A larger individual, showing the aperture in part. From the same locality as the preceding.

Loxonema delphicola.

Page 47.

Figs. 19, 20. Two small specimens, showing considerable variation in the apicial angle, but both having the sutural band. From the Hamilton group; the first specimen from Cayuga, the other from Seneca Lake, N. Y.

Fig. 21. A specimen, showing very coarse markings and a well-defined sutural band. From the soft shales of the Hamilton group, Cayuga Lake, N. Y.

Figs. 22, 23. Two views of a specimen, with finer surface-markings and a very distinct sutural band. From the harder layers of the Hamilton group, Delhi, N. Y.

Fig. 24. A specimen enclosed in a coating of smoothed and polished shale (slickensides)—a very common condition of the species in the soft shales. From near Geneva, N. Y.

Fig. 25. A similarly coated specimen, from Cayuga Lake, N. Y. These specimens indicate the commencement of the accretion of soft material about the shell, which, in its final condition, envelops the fossil in a more or less distinctly formed concretion.

PLATE XIV.

Loxonema delphicola.

Page 47.

Fig. 1. A large compressed specimen, marked by fine striæ, and showing a distinct sutural band. Hamilton shales, near Bellona, N. Y.

Fig. 2. A specimen from the same locality having the last volution greatly expanded, with fine markings, while the upper part is more coarsely marked. The sutural band is unusually wide. The apparent distortion is mainly a condition of growth, and not accidental.

It may be questionable whether the existence of a sutural band is of specific importance, and the degree of development of this feature in different individuals suggests a doubt as to the reliance of this character for specific distinction between *L. Hamiltoniæ* and *L. delphicola.*

Loxonema Bellona.

Page 46.

Fig. 3. A specimen which is mostly denuded of the shell, but showing the form of the volutions. A small fragment of shell on the body-volution exhibits the surface-marking as indicated in the figure.

Figs. 4, 5. Two fragments showing the form of volution and surface-markings.

Loxonema terebra.

Page 48.

Figs. 6, 7. Gutta-percha casts in the natural mold, giving the form of the shell and the surface-markings.

Loxonema styliola.

Page 48.

Figs. 8, 9. Gutta-percha casts, showing the long subulate spire.

Callonema bellatula.

Page 51.

Fig. 10. A small specimen with angular volutions.

Figs. 11, 12. The opposite sides of a medium-sized specimen, having the angular form and showing the umbilicus.

Fig. 13. A larger specimen with rounded volutions.

Fig. 14. A still larger specimen, showing the angularity of the volutions somewhat modified.

Fig. 15. A large rotund specimen referred to this species. From the Upper Helderberg limestone near Louisville, Kentucky; the preceding specimens from Dublin, Ohio.

Callonema imitator.

Page 53.

Fig. 16. The upper surface of the shell, showing the form of the volutions and the surface-marking.

Fig. 17. Lateral view of a specimen showing the elevation of the spire and form of volutions.

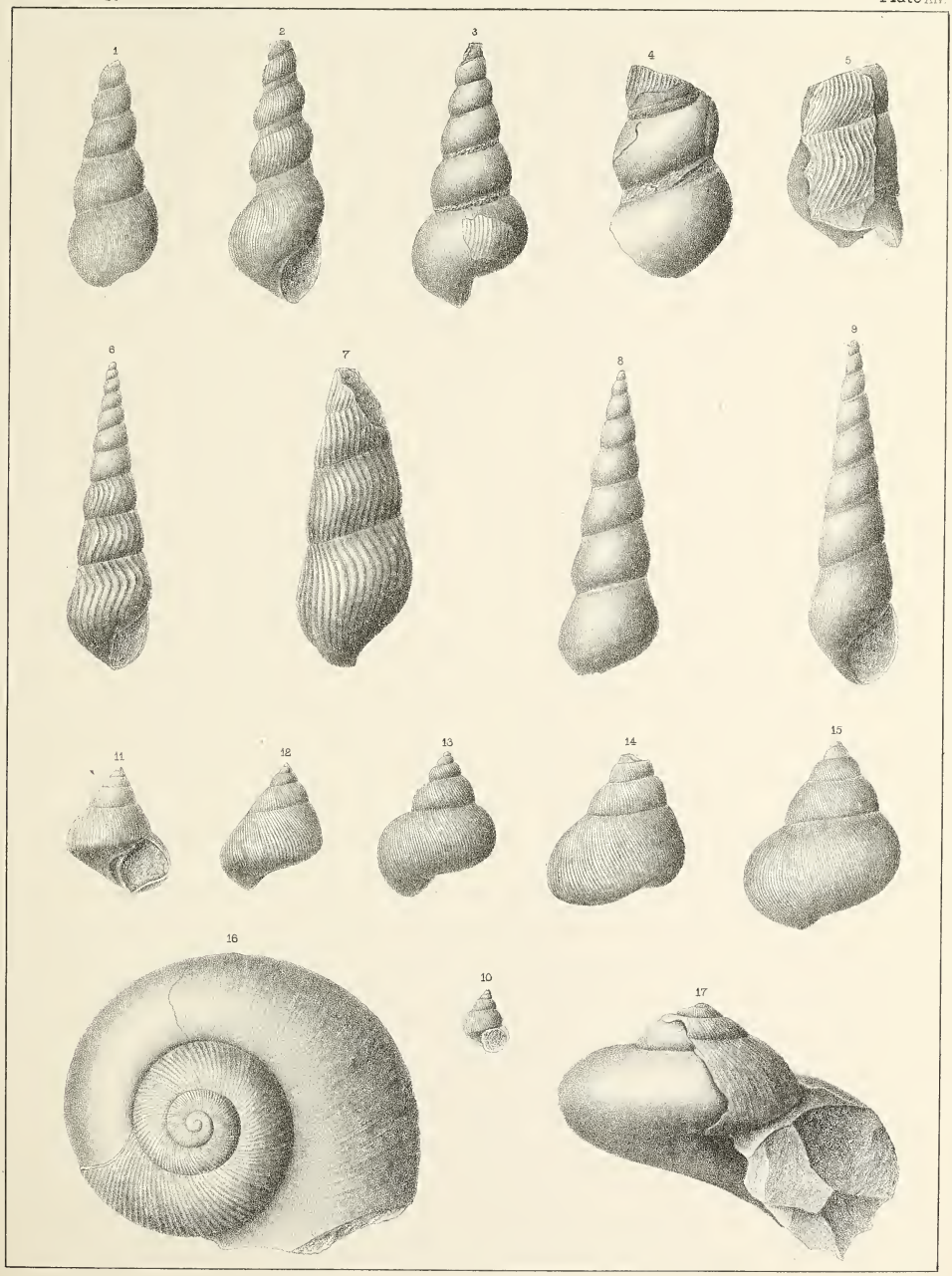

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PLATE XV.

Euomphalus Decewi.

Page 55.

Fig. 1. The inner volutions of a small individual.

Fig. 2. A larger specimen in chert.

Figs. 3, 4 and 8. Three views of a large internal cast of the species.

Figs. 5, 6. Two views of another internal cast.

Fig. 7. An internal cast retaining the inner volutions—a condition seldom noticed in the rocks of New York, these parts being usually destroyed or decollated during the more advanced stages of growth, as shown in figs. 3, 4 and 5.

Euomphalus Tioga.

Page 56.

Figs. 9, 10. The opposite sides of a much worn and imperfect specimen. Fig. 9 shows a part of the outer volution and the impression of the inner ones. Fig. 10 shows the sloping, concave surface of the umbilical side of the shell.

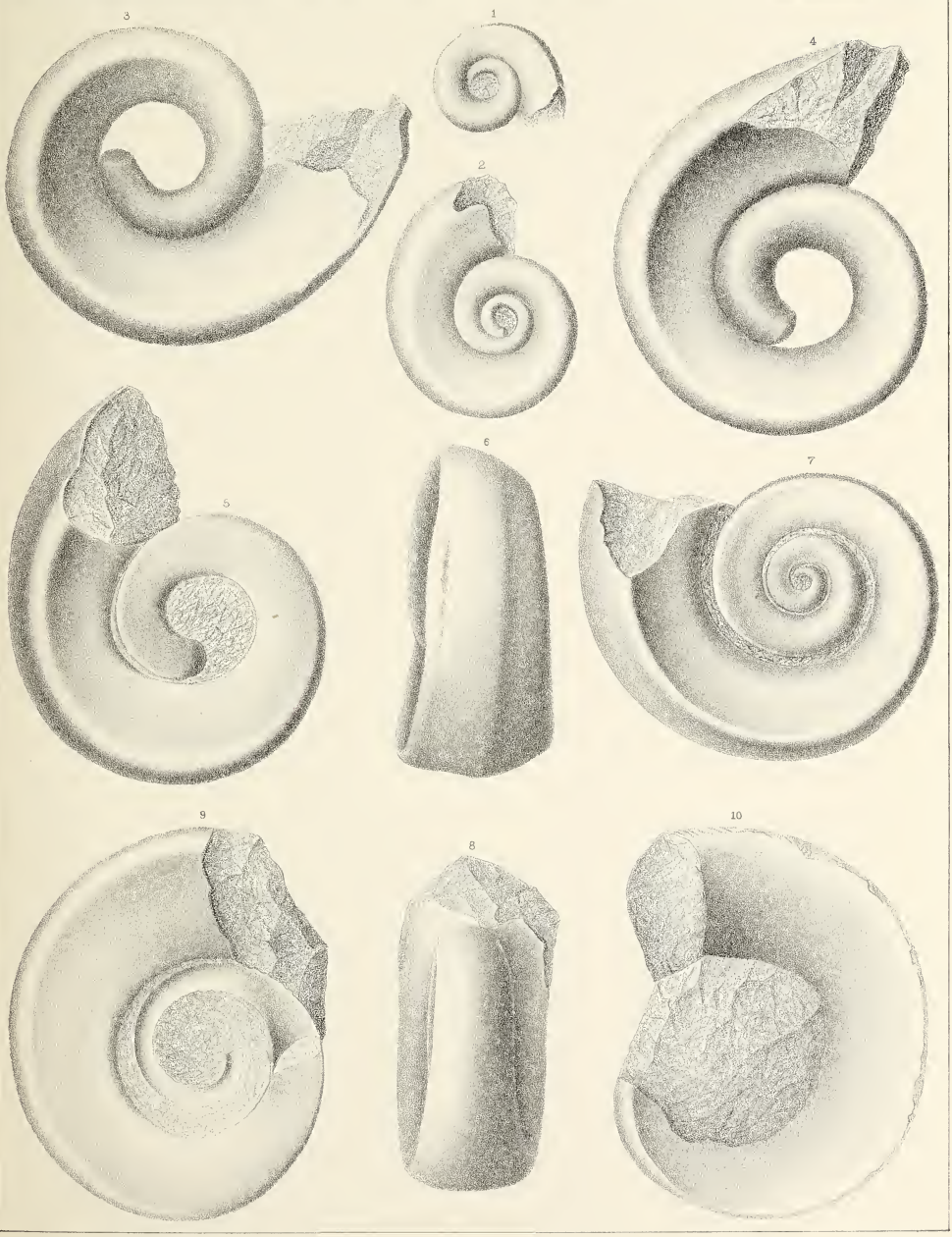
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PLATE XVI.

Euomphalus planodiscus.

Page 57.

Fig. 1. The upper side of a specimen preserving the shell and surface-markings.
Fig. 2. An enlargement of the same.
Fig. 3. The same side of a larger specimen, showing a different character of surface.
Fig. 4. A large internal cast, showing the size of the tube and comparative thickness of shell.

Euomphalus (Straparollus) inops.

Page 58.

Fig. 5. The umbilical side of the specimen. From Schoharie, N. Y.

Euomphalus (Straparollus) rudis.

Page 58.

Fig. 6. The upper surface of a moderately large specimen, from which the shell has been partly removed.
Fig. 7. The upper surface of a larger individual.

Euomphalus (Phanerotinus) laxus.

Page 60.

Fig. 8. A small specimen consisting of an entire volution. From the Hamilton group at Bellona, N. Y.
Fig. 9. A larger specimen consisting of less than one volution. From the Hamilton group, Otsego county, N. Y.
Fig. 17. A specimen of the species from Schoharie, N. Y.
Fig. 18. A specimen preserving the inner volutions and imprint of the outer volution.

Euomphalus (Straparollus) Hecale.

Page 59.

Fig. 10. The umbilical side of a specimen of about the medium size, as obtained from a gutta-percha impression in the natural mold. From Meadville, Pa.
Figs. 11–14. A series of specimens showing the prevailing characters of the species as seen in this association, from western New York.

Euomphalus (Straparollus) clymenioides.

Page 62.

Fig. 15. A small specimen from the Schoharie grit. Schoharie, N. Y.

Phanerotinus parodoxus, *Winchell.**

Page 60.

Fig. 16. One of the specimens used by Mr. Winchell in the description of the species (taken from a cast).

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* This species, which I have compared with *E. (P.) laxus*, is certainly distinct from it.

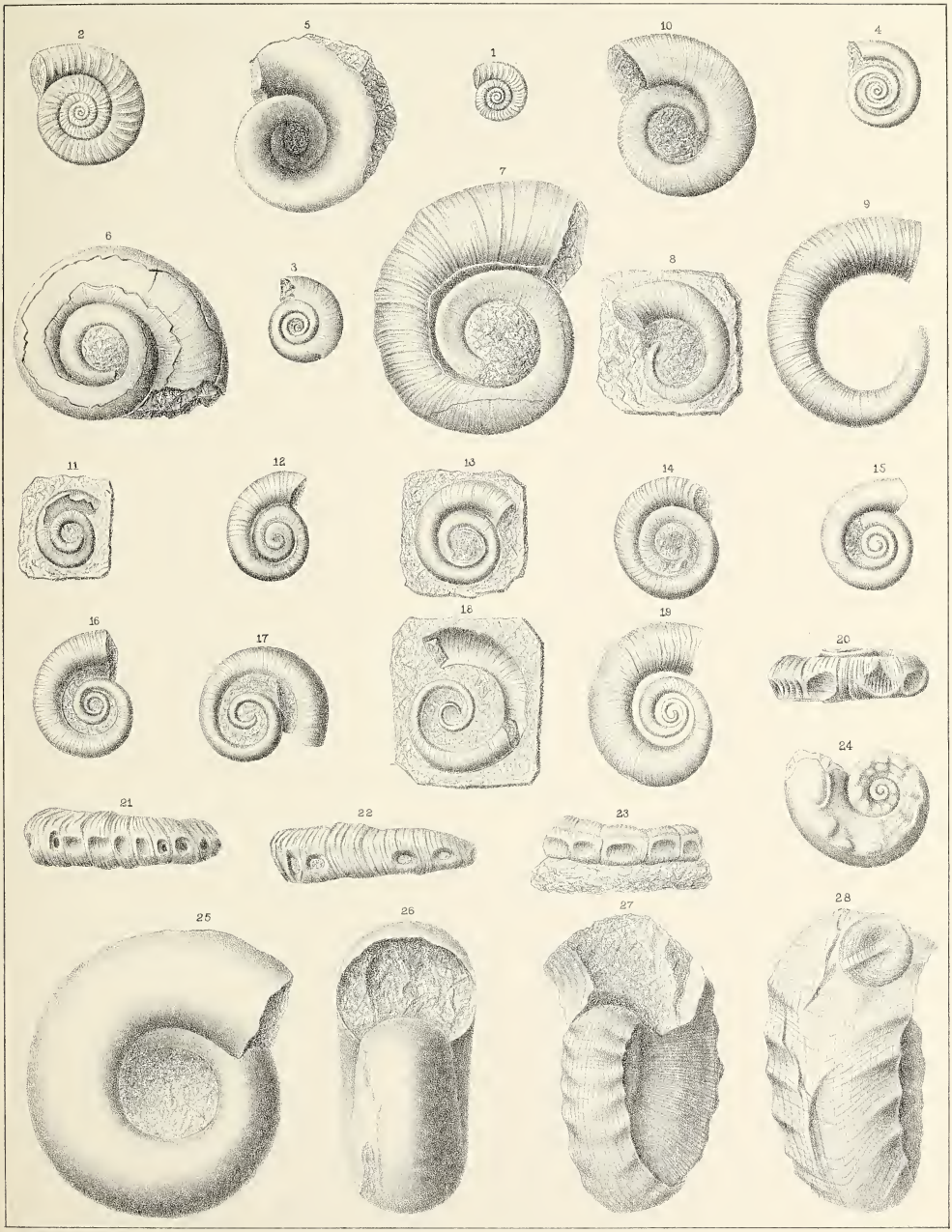
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PLATE XVI.—*Continued.*

Euomphalus (Phanerotinus) Eboracensis.

Page 61.

Fig. 19. The upper surface of an entire specimen showing the general form.

Fig. 20. The periphery of the spire, showing the cicatrices.

Figs. 21–23. The peripheral sides of three other specimens which consist only of parts of the outer volution. All of these show the constrictions of the tube and the cicatrices left by the removal of fragments; figs. 21 and 22 show the scars extending entirely through the shell.

Porcellia Hertzeri.

Page 126.

Fig. 24. Lateral view of the specimen, natural size.

Goniatites plebeiformis.

Page 448.

Figs. 25, 26. Lateral and profile views of an individual preserving the chamber of habitation: the inner volutions having been dissolved and removed.

Porcellia Nais.

Page 127.

Fig. 27. Apertural view of the typical specimen, which has been obliquely crushed, showing the form and characters of the shell and the surface-markings.

Fig. 28. The back of the specimen, showing the breadth of the outer volution, the retral bending of the surface striæ across the dorsum, and the oblique, elongate nodes of the lateral angles.

PLATE XVII.

Pleurotomaria arata.

Page 61.

Fig. 1. The upper side of the spire of a very characteristic specimen, somewhat compressed vertically, but not greatly distorted.
Fig. 2. The same, showing the depth of the volutions and form of the aperture.
Fig. 3. Basal view, showing the umbilicus.
Fig. 4. A cast, with unusually elevated spire and rotund volutions.
Fig. 5. The summit of the same individual.
Fig. 6. A vertically compressed specimen forming a strong contrast with fig. 4.
Fig. 7. The upper surface of an obliquely compressed specimen which preserves the characteristic markings, and shows the spiral band with retrally curving striæ, as in fig. 1.
Fig. 8. An obliquely compressed specimen with finer surface-markings.

Pleurotomaria arata var. clausa.

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Figs. 9, 10. Two views of a small gibbous specimen which bears a close resemblance to the more rotund forms of *P. arata*.

Pleurotomaria plena.

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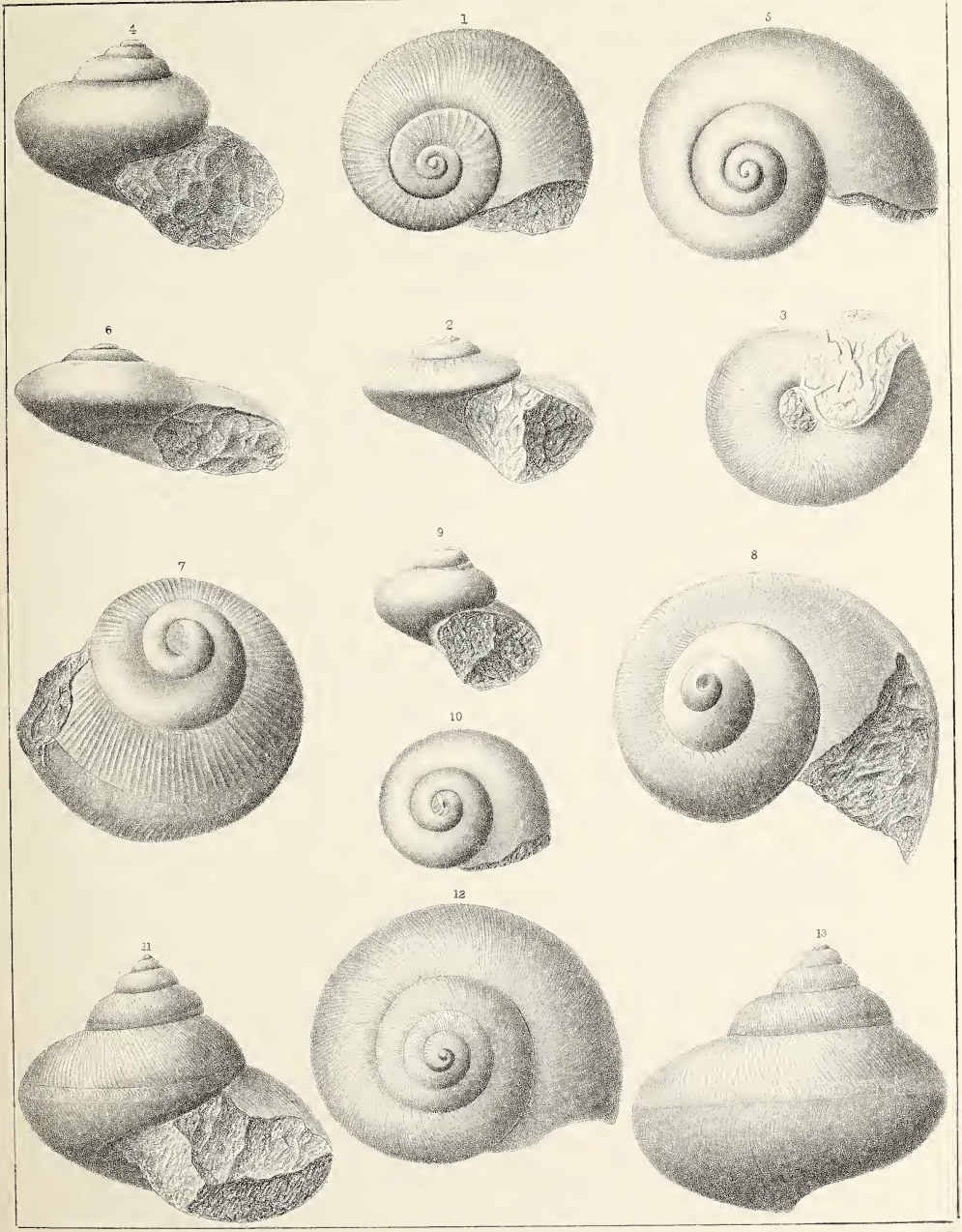
Figs. 11–13. Three views of a large, well-formed specimen, showing the form, surface-markings and spiral band. The outer volution is represented as slightly too rotund.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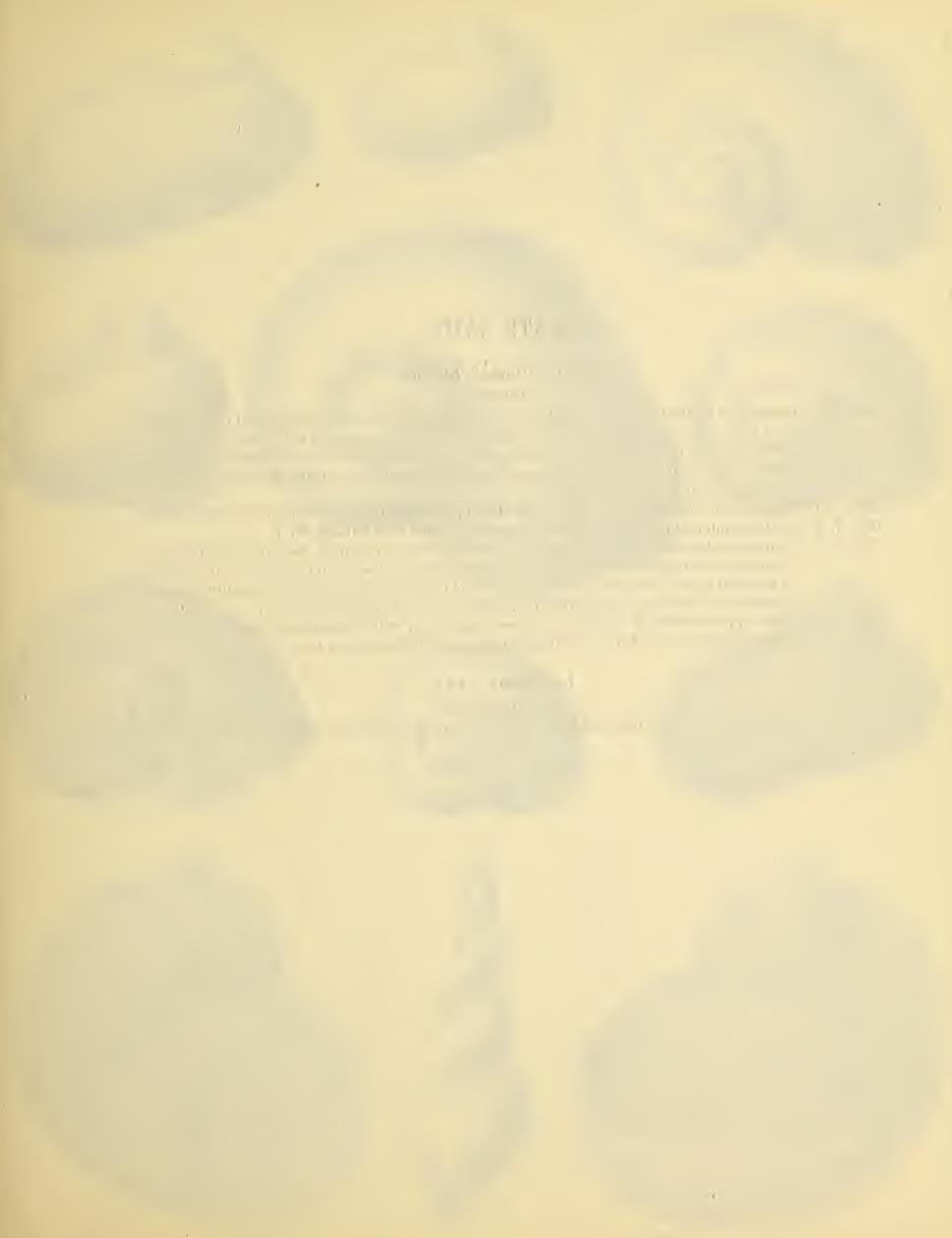

PLATE XVIII.

Pleurotomaria Lucina.

Page 67.

Figs. 1. 2. Lateral and vertical views of a small rotund specimen, which is mostly an internal cast, but shows the form of the volutions. From the Upper Helderberg limestone, Falls of the Ohio.

Figs. 3, 4. Lateral and summit views of the original specimen figured in the Fourth District Report, showing the general features of the shell, but not the surface-markings. From the Upper Helderberg limestone, Clarence Hollow, N. Y.

Figs 5, 6. Two views of a large internal cast. From the Upper Helderberg limestone, near Columbus, Ohio.

Fig. 7. A very large internal cast, probably of this species. From near Batavia, N. Y.

Figs. 8, 9. Summit and lateral views of a large, well-formed specimen, retaining the surface-marking more perfectly than usual in the limestone, and showing the spiral band with its characteristic features. The spiral band is not seen upon the second volution, although the surface texture is partially preserved. From the Upper Helderberg limestone, Clarence Hollow, N. Y.

Figs. 10, 11. The opposite sides of a large compressed specimen, with surface-markings much stronger than the preceding. From the Hamilton group, near Skaneateles Lake, N. Y.

Loxonema laxa.

Page 49.

Fig. 12. An internal cast. From the hard layers of the Chemung group, near Nichols, Tioga county, N. Y.

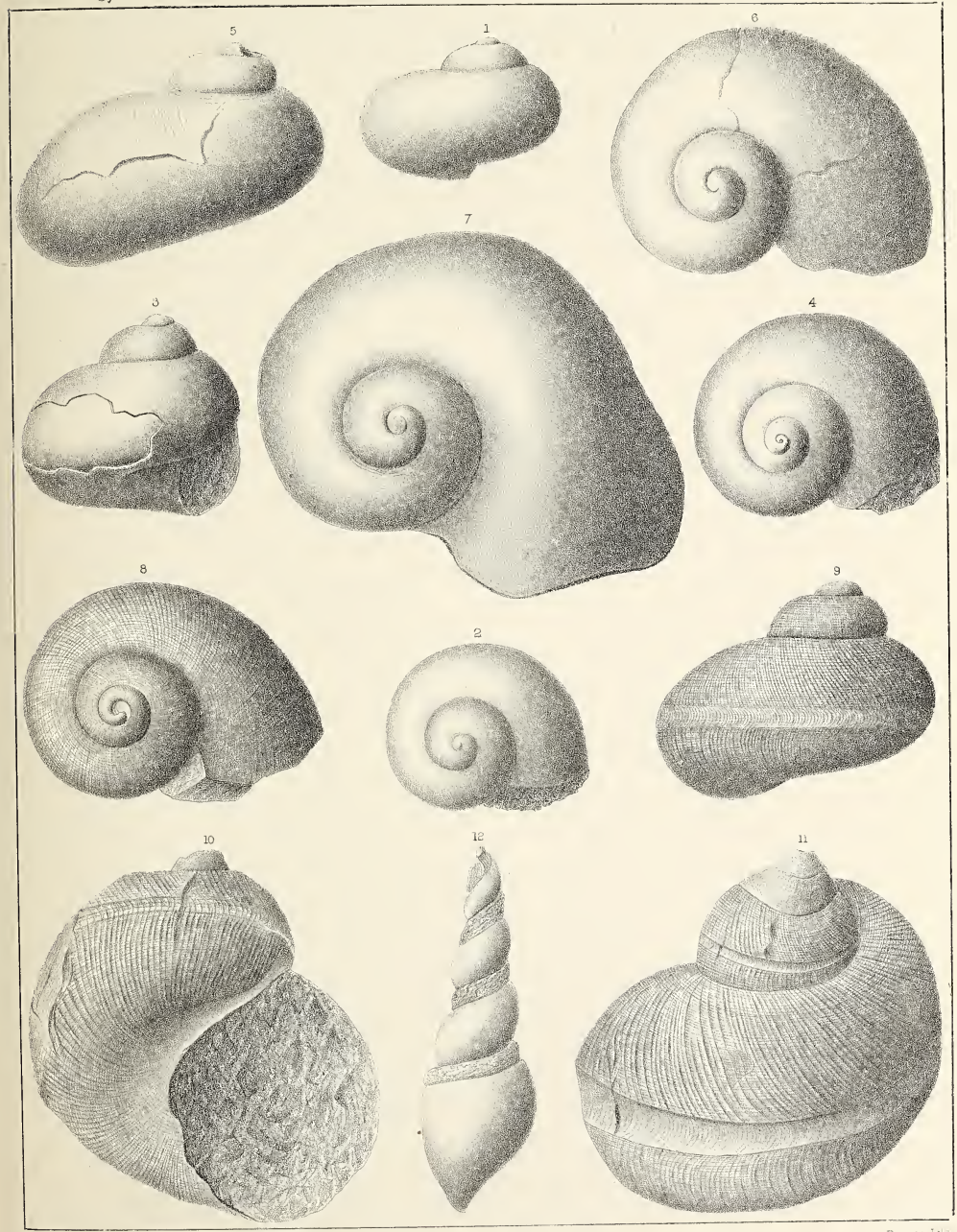
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PLATE XIX.

Cyclonema Doris.

Page 34.

Fig. 1. An example of this species from the Schoharie grit, Schoharie, N. Y.

Pleurotomaria Hebe.

Page 68.

Figs. 2–4. Summit, front and basal views of a specimen nearly denuded of shell, but showing the general form and to some extent the surface characters. The appearance of a callus covering the umbilicus is due to the fracture of the solid part of the columella.

Figs. 5, 6. The opposite sides of a specimen retaining a portion of the shell and showing surface characters.

Fig. 7. A larger specimen nearly denuded of shell.

Pleurotomaria sulcomarginata.

Page 69.

Fig. 8. The upper side of a specimen. From the Falls of the Ohio.

Figs. 9–11. Three views of a specimen of the usual size as known in the Hamilton group of New York, retaining the shell and surface characters.

Fig. 12. Enlargement to two diameters of a small, imperfect specimen, with surface features strongly marked. Hamilton group, Pratt's Falls, N. Y.

Figs. 13, 14. Two views of a specimen enlarged to two diameters, showing the more distinct surface striæ. From the Hamilton group, Delphi, N. Y.

Fig. 15. A large internal cast referred to this species. Hamilton group at Cumberland, Md.

Fig. 16. An internal cast. From the Hamilton group near Delphi, N. Y.

Fig. 17. A small specimen, a partial cast, enlarged to three diameters. From the Hamilton group near Delphi, N. Y.

Pleurotomaria delicatula.

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Figs. 18, 19. Two views of a specimen with shell, in part, and showing the surface characters.

Pleurotomaria rotalia.

Page 71.

Figs. 20, 21. Two views of a specimen of usual form and size, enlarged to four diameters. Fig. 21 shows the band on the periphery.

Fig. 22. The largest individual found, enlarged to three diameters, showing some modifications in the band bordering the suture.

Figs. 23, 24. Basal views of two specimens, showing a slight variation in the form and size of the callus surrounding the umbilicus.

Fig. 25. Lateral view of a large internal cast for comparison with the small specimens of *P. sulcomarginata* which are of similar size and condition as in fig. 17.

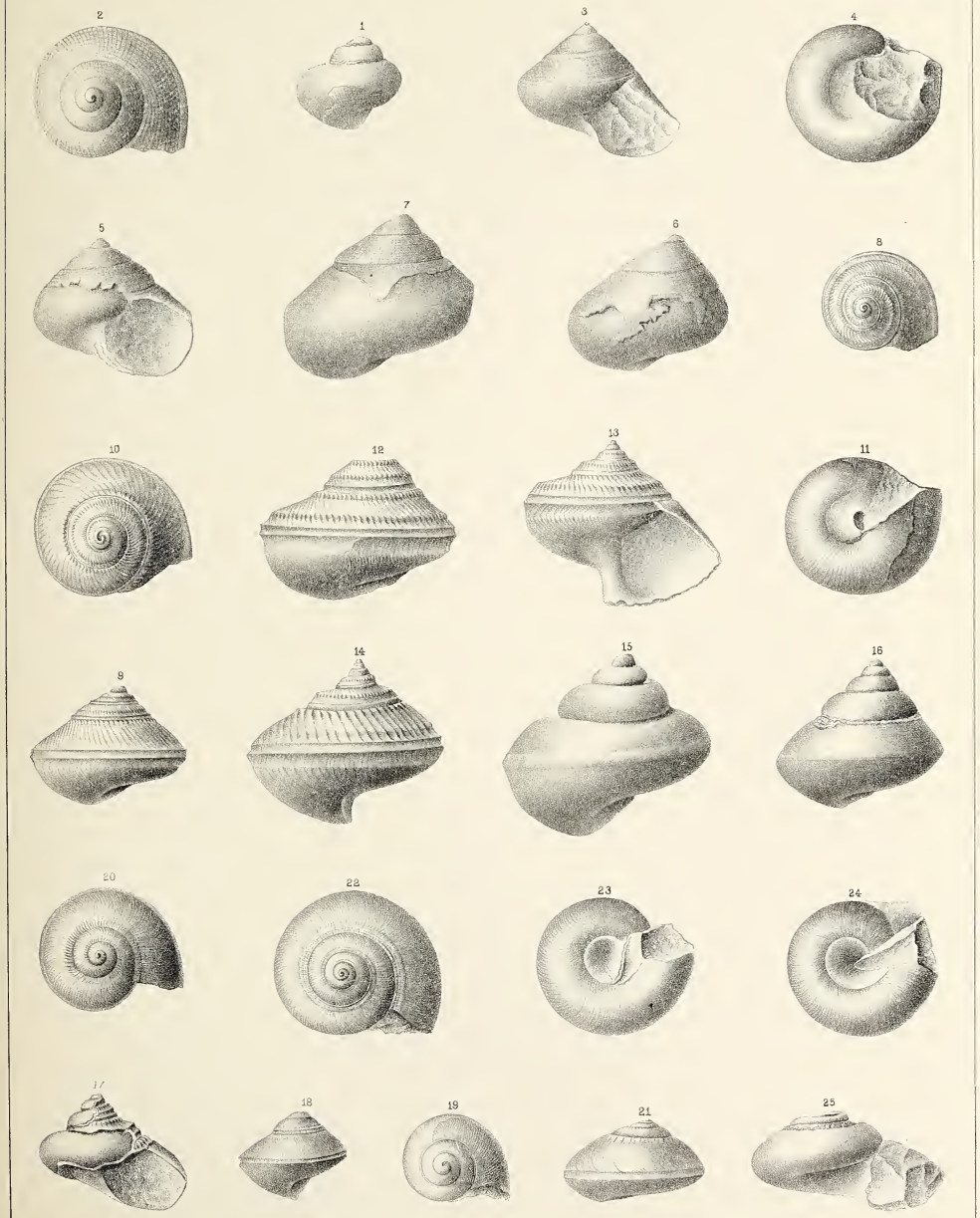
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PLATE XX.

Pleurotomaria rugulata.

Page 75.

Figs. 1–3. Three views of a specimen having the shell denuded; fig. 2 shows the plicæ near the lip.

Figs. 4, 5. The spire of another specimen and apertural view of the same.

Fig. 6. Enlargement to two diameters of a specimen with high spire and obliquely compressed volutions. The substance of the shell is preserved showing the surface-markings and spiral band.

Fig. 7. Enlargement to two diameters of a specimen with more ventricose volutions and shorter spire, preserving the spire and having a proportionally wider band.

Pleurotomaria Ityx.

Page 76.

Fig. 8. A large specimen almost denuded of shell, but indicating surface-markings on the upper volutions, and remains of the spiral band on the last volution. From near Bellona, N. Y.

Figs. 9, 10. Two views of an internal cast. From Cumberland, Md.

Figs. 11, 12. Two views of a partial cast retaining traces of the surface characters toward the aperture. From western New York.

Fig. 13. A cast showing only the remains of the spiral band. From Canandaigua Lake, N. Y.

Fig. 14. A specimen preserving the surface characters in remarkable perfection. From Pratt's Falls, near Pompey, Onondaga county, N. Y.

Fig. 15. A large, well-preserved specimen retaining the surface characters. From York, Livingston county, N. Y.

Fig. 16. Enlargement of a part of the body-volution of the specimen figure 11.

Fig. 17. Enlargement of a part of the body-volution of fig. 15, showing some differences in the strength and character of the markings from those of fig. 16.

Pleurotomaria capillaria.

Page 77.

Figs. 18, 19. A specimen enlarged to two diameters, of usual form and size. From the Hamilton group, Madison county, N. Y.

Fig. 20. Enlargement (two diameters) of a specimen, preserving the upper volutions, and showing surface characters different from the preceding. From the soft shales of the Hamilton group, Norton's Landing, east side of Cayuga Lake, N. Y.

Fig. 21. Enlargement to two diameters of a specimen which differs in surface characters from the preceding. From the same locality.

Pleurotomaria Ella.

Page 72.

Figs. 22–25 The opposite sides, summit and basal views of a specimen which exhibits the surface characters very perfectly. It has probably been somewhat compressed vertically, flattening the volutions, but not materially altering the form.

Pleurotomaria filitexta.

Page 73.

Fig. 26. The side of a flattened specimen with surface characters very beautifully preserved. The transverse striæ are too coarse in the figure, and the revolving striæ should be entirely subordinate.

Fig. 27. The opposite side of the same specimen, having a part of the outer volution broken away revealing the columella and umbilical callus.

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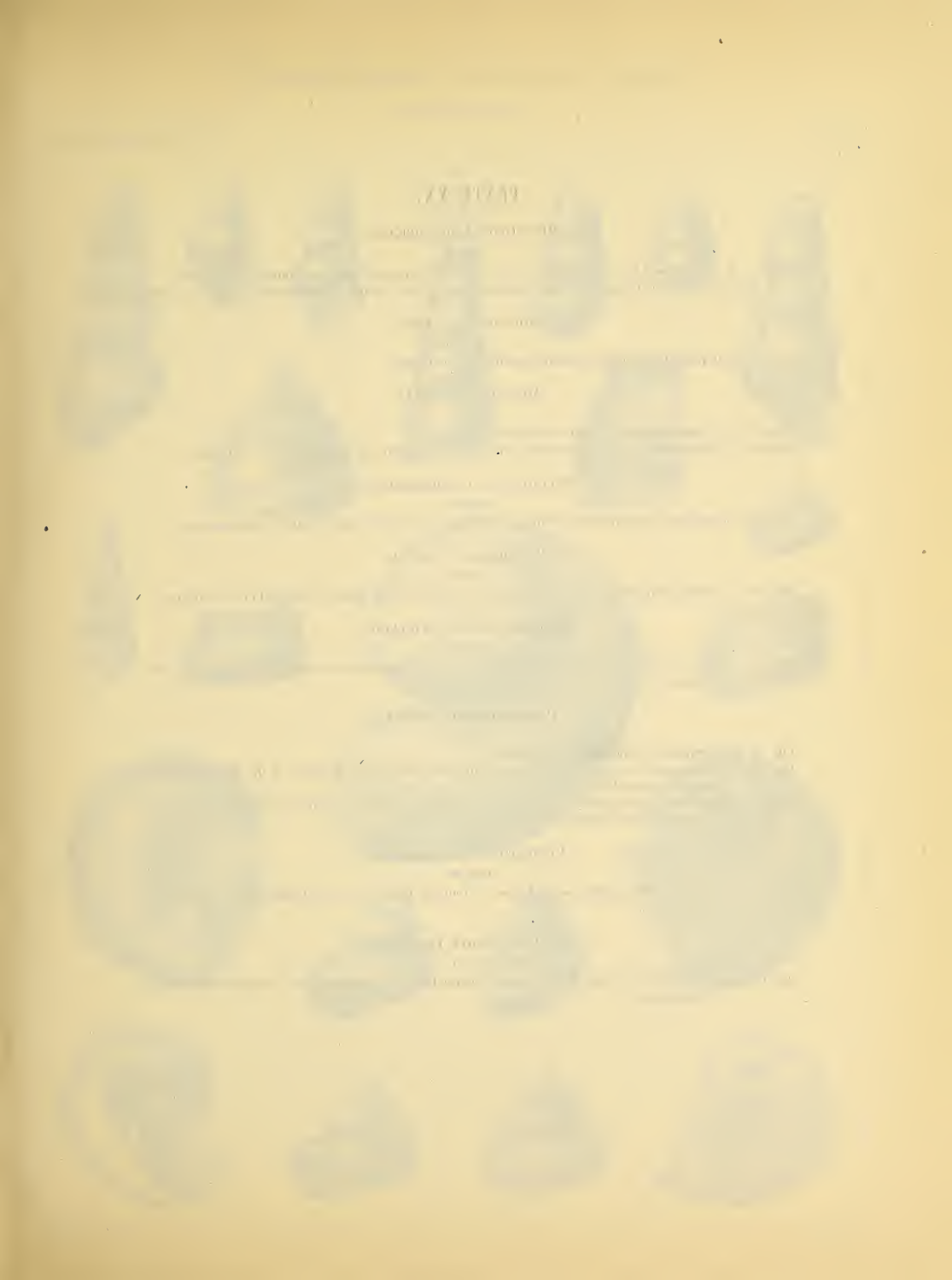

PLATE XXI.

Murchisonia desiderata.

Page 89.

Figs. 1, 2. Anterior and posterior views of a specimen with incomplete spire and imperfect aperture.
Fig. 3. An enlargement of part of a single volution, showing the character of the striæ and peripheral band.

Murchisonia Leda.

Page 91.

Fig. 4. An imperfect specimen of this species, showing the mouth.

Murchisonia Maia.

Page 91.

Figs. 5, 7, 8. Imperfect individuals of the species.
Figs. 6, 9. Enlargements of a single volution, showing the character of striæ and peripheral band.

Murchisonia desiderata var.

Page 90.

Fig. 10. A cast from a mold in silica, giving a somewhat more slender form than the typical specimen.

Murchisonia micula.

Page 93.

Fig. 11. A specimen imperfect at the apex (a common condition of the species), enlarged to six diameters.

Pleurotomaria? apicialis.

Page 88.

Fig. 12. View of the spire of a specimen as obtained by a gutta-percha cast taken from the natural mold; enlarged to two diameters.

Pleurotomaria trilix.

Page 79.

Fig. 13. Enlargement of a specimen of this species.
Fig. 14. An enlargement of a specimen to two diameters. From the soft shales of the Hamilton group, outlet of Crooked Lake, N. Y.
Fig. 15. Enlargement of the typical specimen to two diameters; the upper volutions are imperfect. From the shales of the Hamilton group, Seneca Lake, N. Y.

Pleurotomaria adjutor.

Page 80.

Fig. 16. A specimen of this species (natural size). From the limestone of the Upper Helderberg group, Dublin, Ohio.

Pleurotomaria insolita.

Page 81.

Fig. 17. The only specimen of this species known, enlarged to three diameters, and showing the character of the surface.

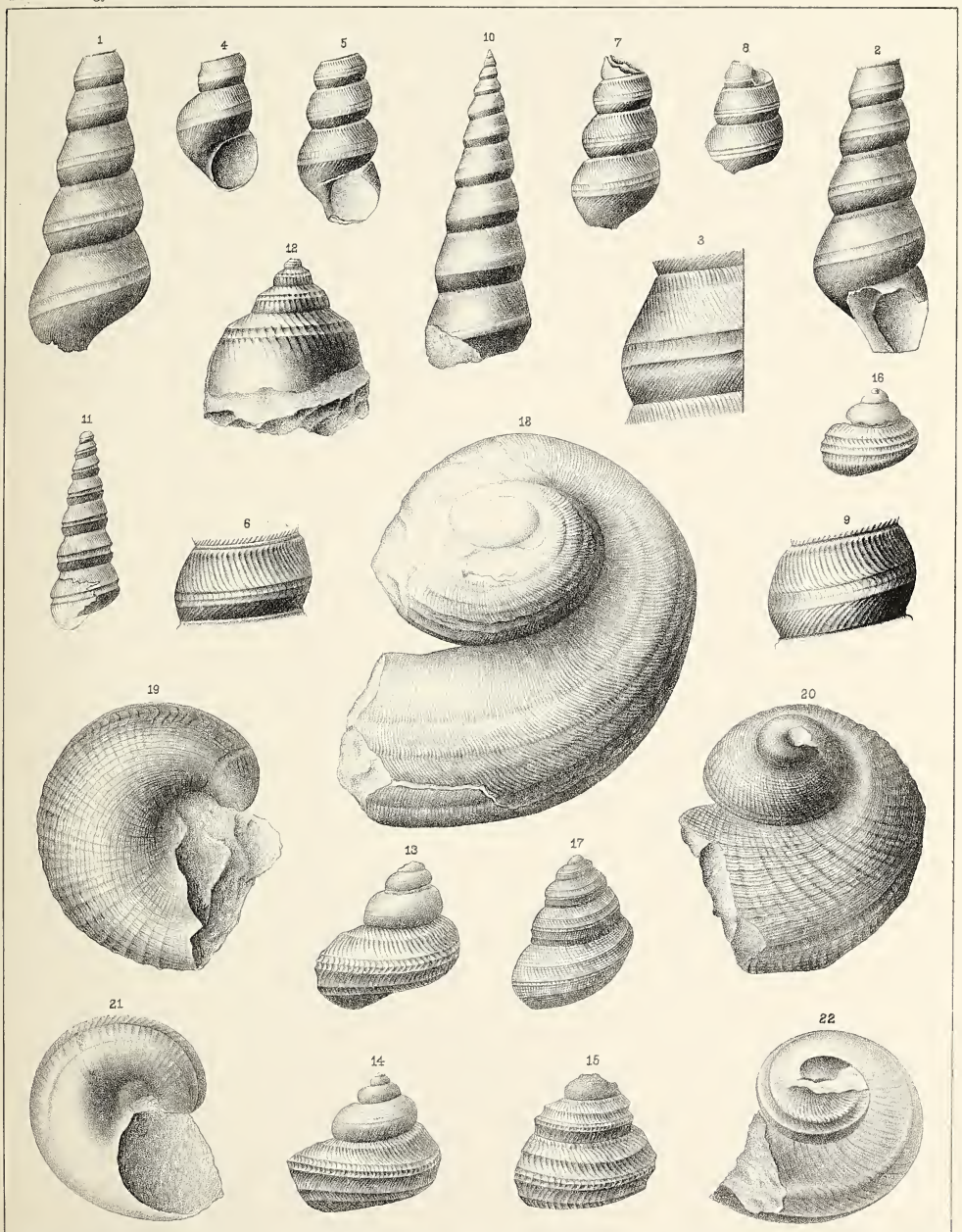
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PLATE XXI.—*Continued.*

Pleurotomaria disjuncta.

Page 84.

Fig. 18. The only specimen of the species yet known, showing the surface characters over most of the shell. The outer volution is disconnected from the preceding near the aperture, but this may be the result of extreme compression.

Pleurotomaria Lucina var. perfasciata.

Page 83.

Fig. 19. The lower surface of a specimen, showing the strong concentric, fasciculate striæ of the upper surface continued across this part of the shell

Fig. 20. The upper surface of the same, presenting the usual features of the species on the smaller volution, but showing stronger concentric striæ on the larger volution. The specimen is obliquely compressed so as to destroy the rotundity of form.

Pleurotomaria planidorsalis.

Page 82.

Figs. 21, 22. The under and upper surfaces of a specimen which is obliquely compressed, and having the spiral band nearly obliterated.

PLATE XXII.

Bellerophon curvilineatus.

Page 94.

Fig. 1. Lateral view of a small specimen retaining the shell and surface-marking.

Figs. 2, 3. Lateral and profile views of a large, perfect specimen, showing the form and surface-markings; probably the original of Mr. Conrad's description.

Fig. 4. A large specimen somewhat compressed, showing strong wrinkles near the aperture.

Fig. 5. Lateral view of a specimen of large size, the shell being principally exfoliated.

Fig. 6. An internal cast of a specimen, not compressed.

Bellerophon Pelops.

Page 95.

Figs. 7, 8. Dorsal and lateral views of a specimen enlarged.

Fig. 9. Partial view of the aperture of a specimen enlarged two diameters.

Fig. 10. Dorsal view of a cast.

Fig. 11. Dorsal view of a smaller cast.

Fig. 12. Lateral view of the specimen fig. 11.

Fig. 13. Lateral view of the specimen fig. 10.

Bellerophon Pelops var. exponens.

Page 96.

Fig. 14. Lateral view of a cast showing the inner volutions.

Bellerophon Newberryi.

Page 97.

Fig. 15. Dorsal view of a specimen enlarged two diameters.

Fig. 16. The aperture of the preceding specimen; the outer lip is broken off, and there is no mesial band, the striæ bending backward on the middle of the shell as in *B. patulus*.

Bellerophon patulus.

Page 100.

Fig. 17. Dorsal view of a symmetrical specimen, marked by fine striæ on the smaller part of the outer volution, and with some strong undulations on the expanded portion.

Fig. 18. A specimen slightly marked by the arching striæ and showing several distinct undulations on the expanded part of the lip.

Fig. 19. A nearly entire individual presenting the usual characters. The specimen is somewhat distorted.

Fig. 20. A small portion of the outer volution of a specimen, showing the strong undulating striæ with a few finer radiating lines.

Fig. 21. A small specimen with very strong, transverse arching striæ, the lip only partially developed.

Fig. 22. Dorsal side of an imperfect specimen, showing the lateral expansions of the columellar lip and the deep sinus in the centre.

Fig. 23. Dorsal view of a specimen where the pustulose lip is less extended.

Fig. 24. Lateral view of a specimen scarcely compressed.

Fig. 25. Lateral view of a specimen from hard limestone.

Fig. 26. The specimen fig. 17, with the smaller part of the volution removed, showing the callus of the inner lip beneath.

Fig. 27. Interior view of a large specimen, showing the pustulose callus covering a portion of the volution.

Fig. 28. The interior of the aperture, showing the pustulose callus nearly covering the preceding volution.

Fig. 29. Ventral side of the specimen fig. 23, showing the thickened columellar lip, with the central pustulose portion elevated above the sides.

Fig. 30. A longitudinal section through the median line, showing the inner volutions and the extent of the thickened lip. (See, also, figures 10, 11, plate 26.)

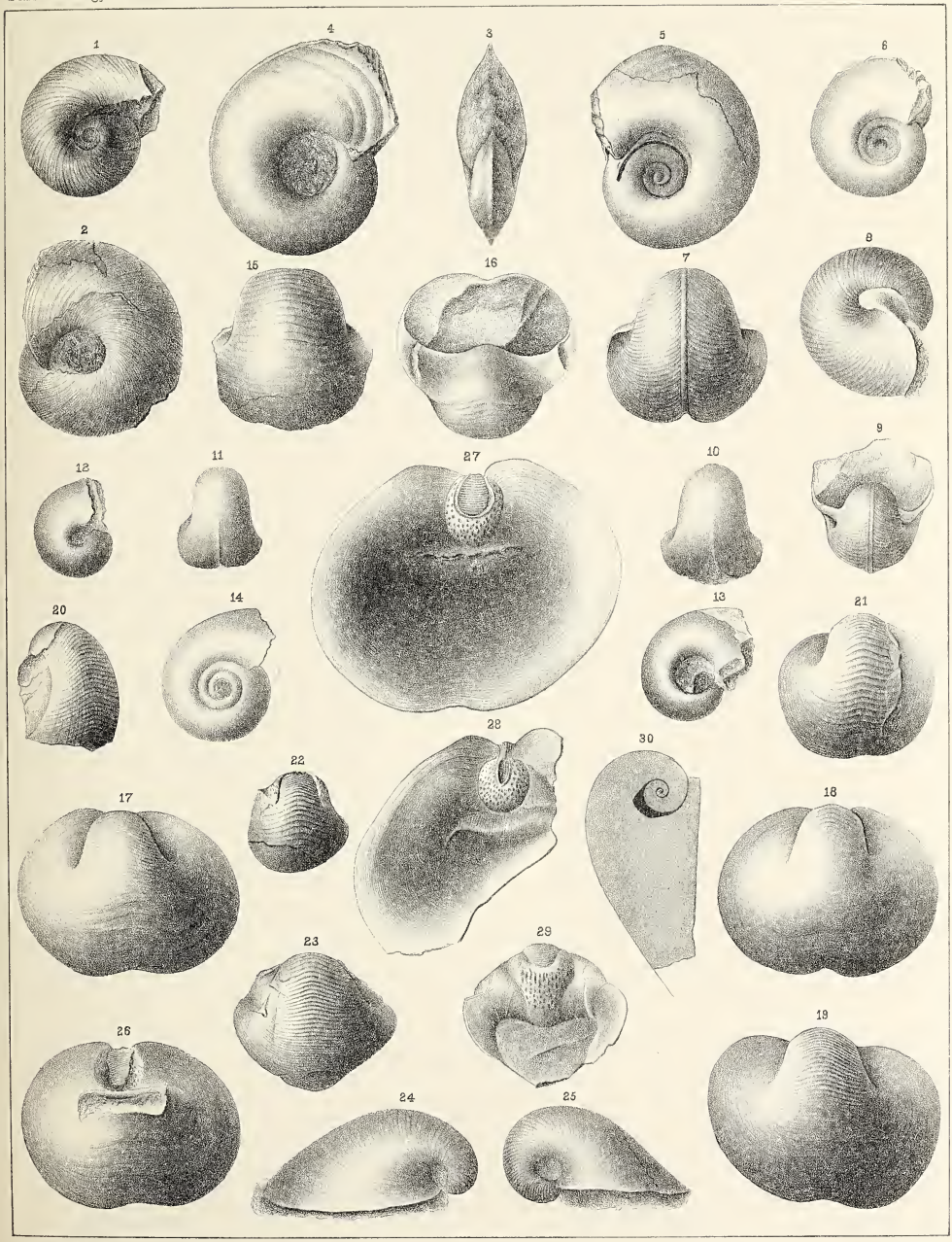
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PLATE XXIII.

Bellerophon Lyra.

Page 113.

Fig. 1. Dorsal view of an imperfect cast.

Bellerophon Leda.

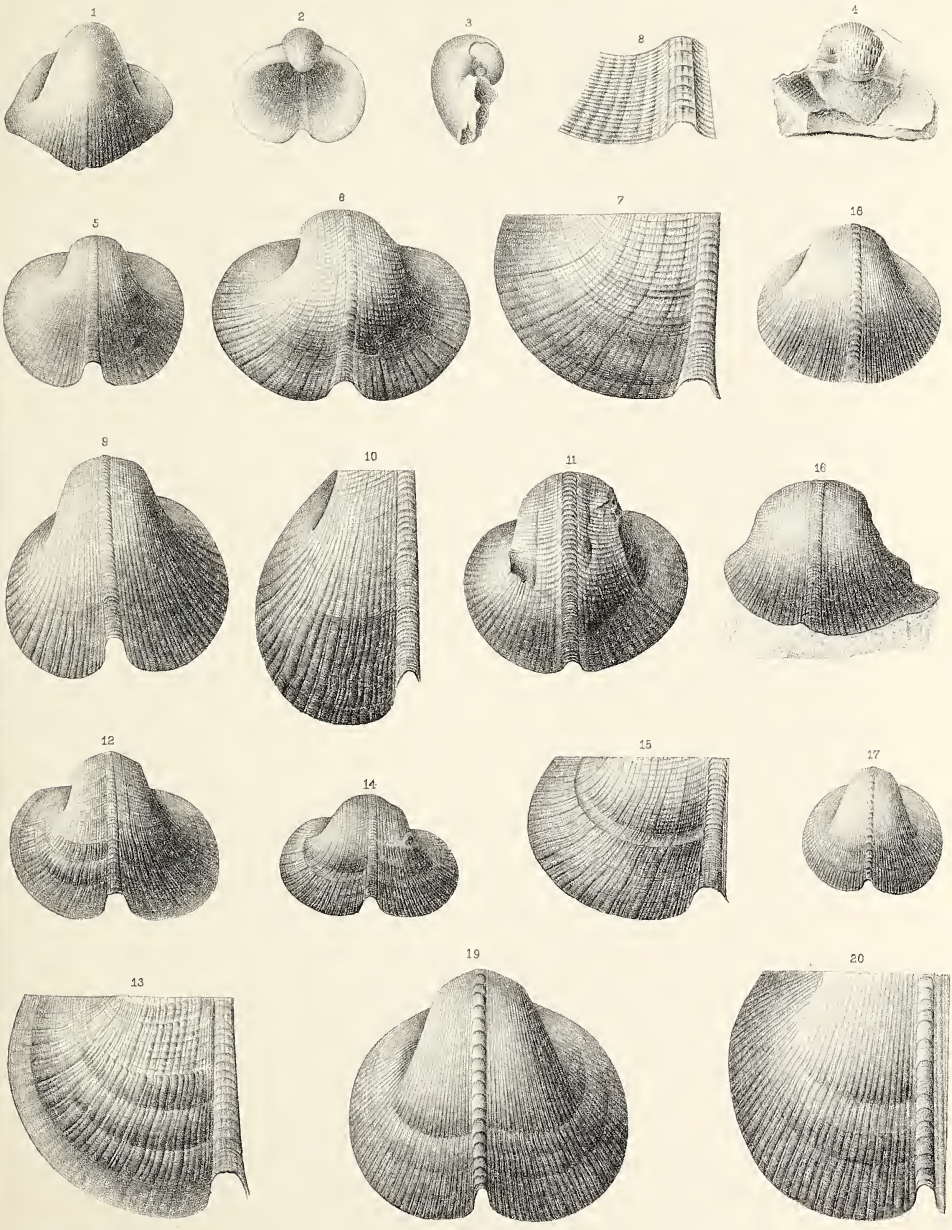
Page 110.

Fig. 2. The interior of a specimen lying in the rock, showing the form of the inner lip.
Fig. 3. Lateral view of a specimen similar to the last.
Fig. 4. A portion of the ventral side of a specimen, showing a pustulose columellar lip.
Fig. 5. A large specimen having the two sets of striæ nearly equal in strength.
Fig. 6. A specimen enlarged to two diameters, showing strong transverse markings.
Fig. 7. A further enlargement of the right side of the lip, showing the surface characters.
Fig. 8. An enlargement of the surface, showing the character of the mesial band and lateral striæ.
Fig. 9. A specimen enlarged to two diameters, showing the transverse lines entirely subordinate.
Fig. 10. A further enlargement of one side of the specimen fig. 9.
Fig. 11. A specimen enlarged to two diameters, showing still stronger concentric markings than in fig. 6.
Fig. 12. Enlargement to one and a half diameters of a specimen where the revolving lines are coalescent and less strong on the body than on the expanded portion; becoming almost obsolete near the margin.
Fig. 13. A still greater enlargement of the last.
Fig. 14. A specimen with revolving lines very strongly marked, which become prominent and irregular on the expanded portion.
Fig. 15. Enlargement to two diameters of a portion of the specimen fig. 14, showing the characteristic features more distinctly.
Fig. 16. The body-volution of an imperfect specimen, enlarged to two diameters, showing nearly equal cancellating striæ.

Bellerophon Lyra.

Page 113.

Fig. 17. The anterior expansion of the last volution, natural size.
Fig. 18. A somewhat compressed specimen enlarged to two diameters, showing the surface-markings.
Fig. 19. A very symmetrical specimen enlarged to two diameters, showing the surface characters and distant arching laminæ crossing the narrow, rounded dorsal band.
Fig. 20. A further enlargement of a part of the specimen fig. 19.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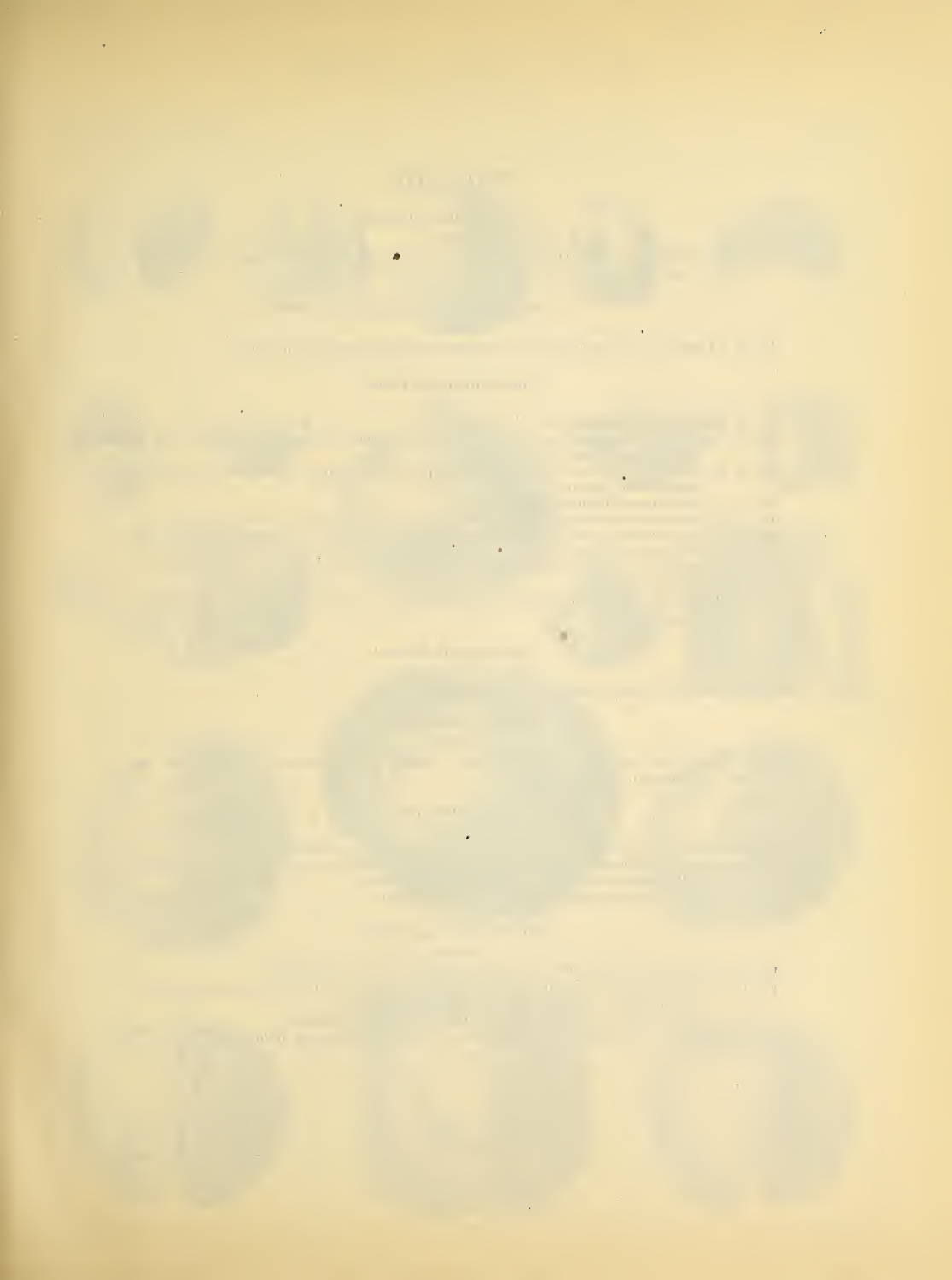

PLATE XXIV.

Bellerophon natator.

Page 108.

Fig. 1. View of the fragment described. The specimen shows the form of the expanded peristome, its strong undulations, and the impression of the inner lip.

Bellerophon triliratus.

Page 117.

Fig. 2. A fragment of the dorsal surface of a specimen, showing the carination and band.

Bellerophon patulus.

Page 100.

Fig. 3. Dorsal view of a cast, probably of this species.

Fig. 4. Lateral view, showing the gradual obsolescence of the transverse striæ on the sides and towards the umbilicus, which is well defined.

Fig. 5. The aperture, showing a continuous thickened lip, with the pustulose callosity not extending to the margin of the aperture.

Fig. 6. A posterior view of the preceding specimen.

Fig. 7. A posterior view of another specimen, where the pustules are elongate and the margin not sinuate.

Fig. 8. A specimen having a wide callosity, with fine pustules arranged upon the arching transverse striæ. The specimen is partially enclosed in concretionary shale with striated surfaces.

Fig. 9. An enlargement of a portion of the dorsal surface, showing the stronger arching ridges and finer intermediate striæ.

Fig. 10. A large, depressed, subhemispheric specimen which is nearly denuded of the shell; probably *B. patulus*.

Bellerophon Helena.

Page 114.

Fig. 11. Dorsal view, enlarged from the original specimen.

Bellerophon Otsego.

Page 104.

Fig. 12. Dorsal view, showing the broad band with the retrally curving striæ and the lobation of the sides of the shell.

Bellerophon rudis.

Page 103.

Fig. 13. A specimen showing the undulations, crossed by interrupted revolving ridges.

Fig. 14. A large, imperfect specimen, with five strong ridges or undulations crossing the axis.

Fig. 15. A smaller specimen, having the same number of undulations.

All the specimens are somewhat distorted by pressure.

Bellerophon triliratus.

Page 117.

Fig. 16. An imperfect specimen, showing broadly expanded and finely striated sides.

Fig. 17. A large, nearly perfect specimen, showing the carina, the dorsal band and striated surface; the expanded portion marked with strong concentric undulations.

Fig. 18. A large, imperfect specimen, showing the distinctly tricarinate character.

Fig. 19. A well preserved and symmetrical specimen, with the dorsal band very distinct.

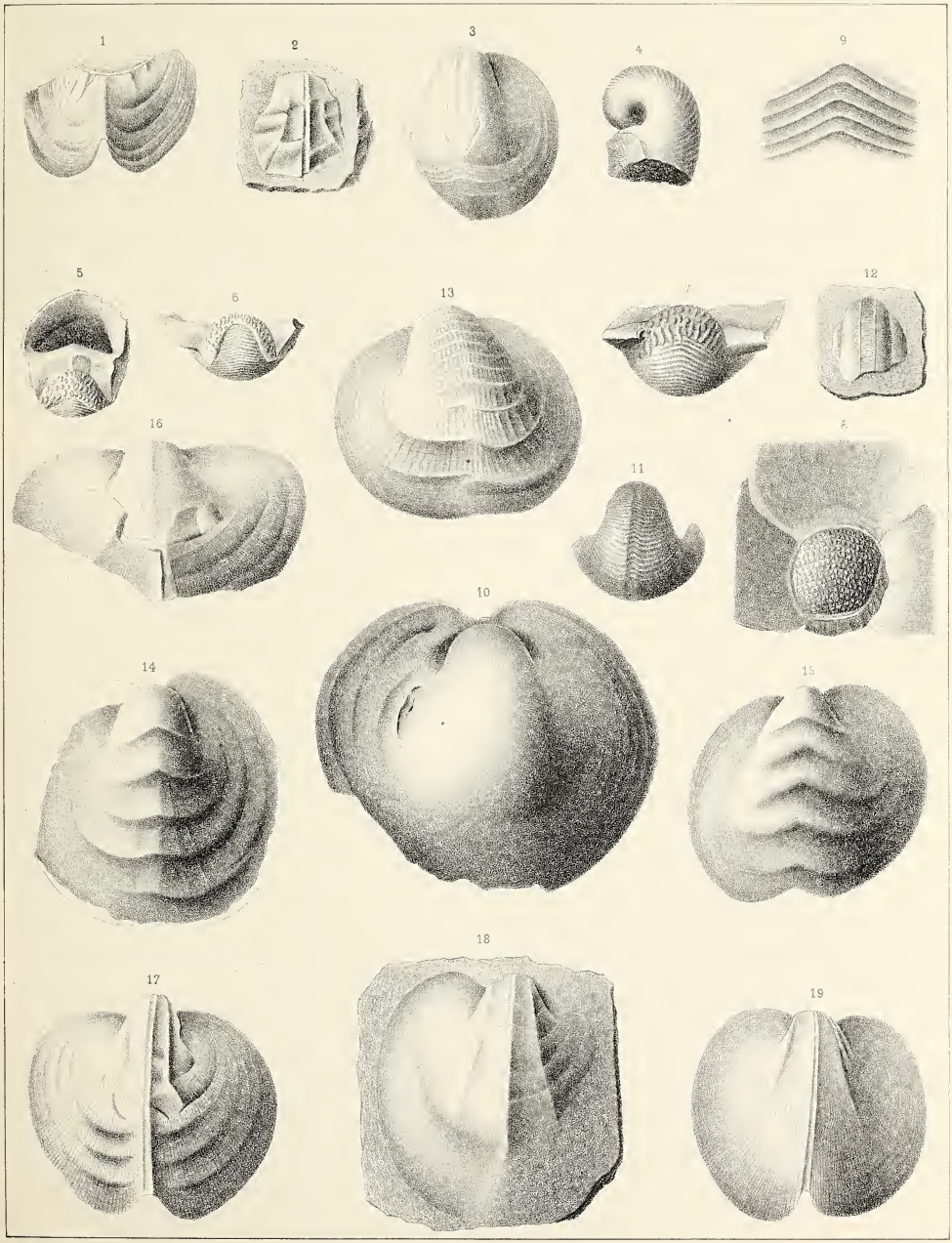
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PLATE XXV.

Bellerophon Thalia.

Page 105.

Fig. 1. Dorsal view of a specimen slightly compressed, and somewhat lengthened in form.

Fig. 2. An obliquely compressed specimen, showing the small umbilicus in an internal cast, and preserving some remains of surface striæ.

Fig. 3. A laterally compressed specimen.

Bellerophon acutilira.

Page 106.

Fig. 4. Lateral view of a compressed specimen enlarged to two diameters, showing the surface stria acutely recurved.

Fig. 5. Dorsal view of a small specimen which preserves the shell on the outer part of the volution.

Figs. 6, 7, 8. Three views of a large, nearly perfect specimen, retaining the shell with surface-markings.

Bellerophon Mæra.

Page 119.

Fig. 9. Oblique lateral view of a specimen, showing the recurving of the lip over the umbilicus. The cast retains faint marks of the surface characters.

Fig. 10. A specimen showing the form of the aperture and reflection of the lip over the sides of the shell. This and the following figs. 11–14 are from gutta-percha impressions in the natural mold.

Fig. 11. A specimen showing the surface characters and the form of the shell.

Fig. 12. A similar specimen compressed, with coarser structure.

Fig. 13. Lateral view of the specimen fig. 11.

Fig. 14. A specimen enlarged two diameters, showing the surface characters and form of the shell.

Bellerophon obsoletus.

Fig. 15. Dorsal view of a specimen as obtained by a gutta-percha cast in the natural mold. The surface striæ make an abrupt retral curve in the centre of the shell.

Bellerophon crenistria.

Page 116.

Fig. 16. Dorsal view of a specimen enlarged four diameters.

Fig. 17. A specimen enlarged three diameters.

Fig. 18. Dorsal view of a specimen partially imbedded in the rock; enlarged to four diameters.

Bellerophon Mæra.

Page 119.

Fig. 19. Dorsal view of a cast, marked only by the sharp dorsal carina.

Cyrtolites (Cyrtonella) pileolus.

Page 125.

Figs. 20–22. Three views of the internal cast of a specimen of the usual form. Fig. 20 shows the impression of a fold on the left side of the posterior lip.

Fig. 29. Dorsal view of a specimen preserving the shell.

Cyrtolites (Cyrtonella) mitella.

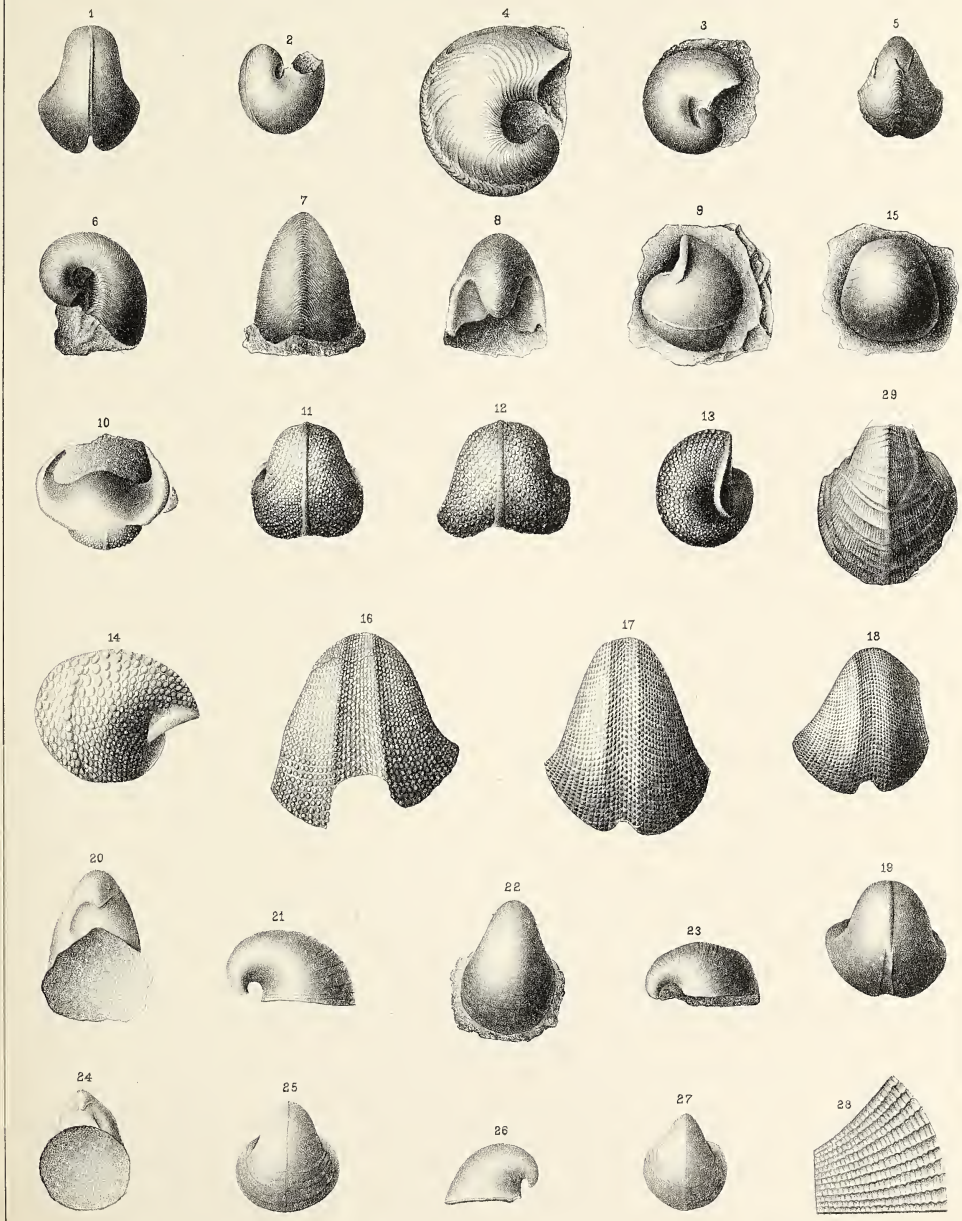
Page 123.

Figs. 23, 25. Lateral and dorsal views of a specimen with the shell partially removed.

Fig. 24. The apertural side of a cast, showing a sinuosity or fold of the lip on the right side.

Figs. 26, 27. Two views of the typical specimen, an internal cast, with the dorsal carina strongly marked.

Fig. 28. Enlargement of the surface from the side of a specimen which preserves the shell.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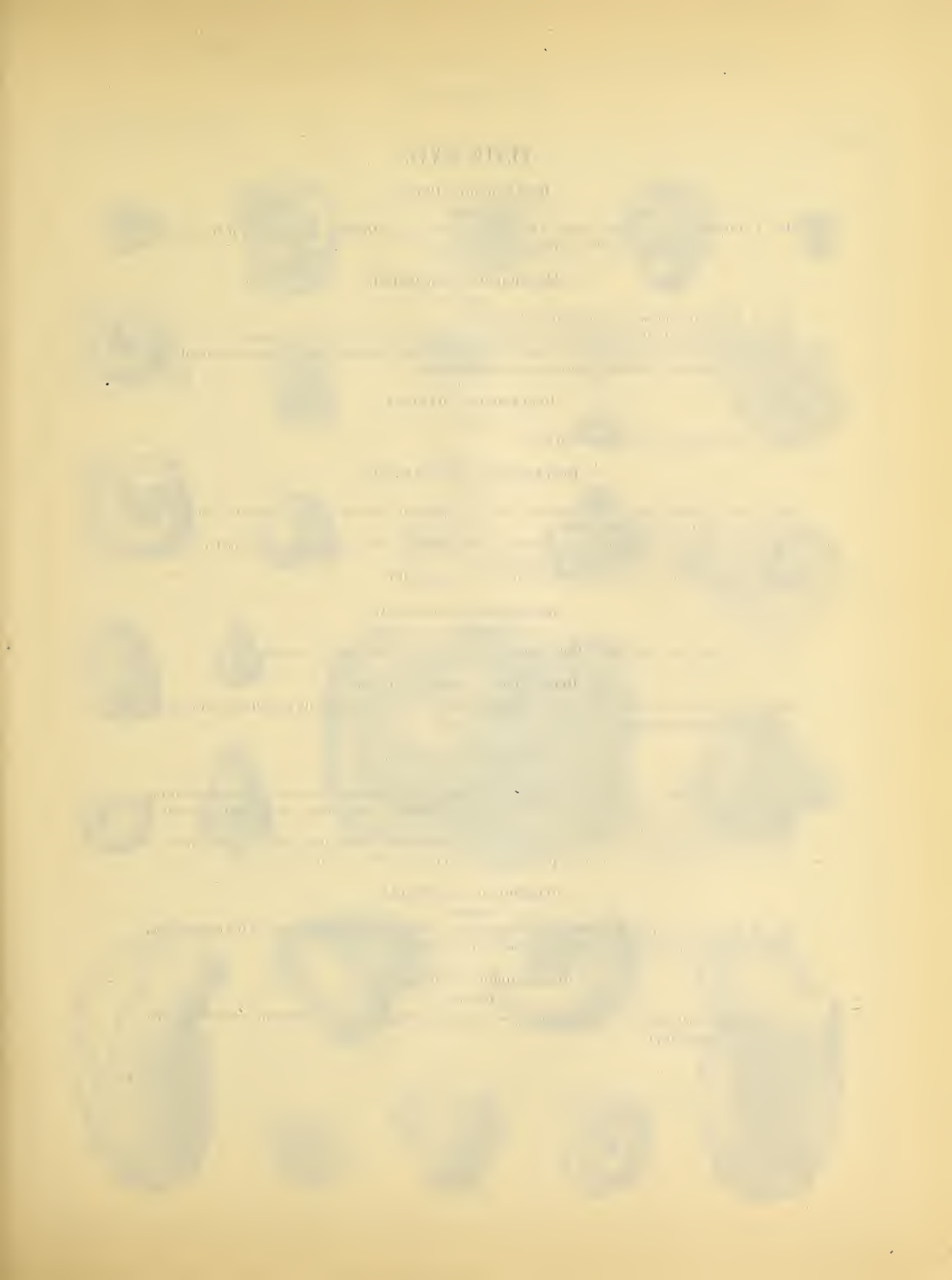
PLATE XXVI.

Bellerophon Pelops.

Page 95.

Fig. 1. Lateral view of a partial cast of a specimen from the Upper Helderberg limestone, at Dublin, Ohio, = *B. propinqua* of F. B. Meek.

Bellerophon Newberryi.

Page 97.

Fig. 2. A specimen preserving the delicate dorsal band.

Fig. 2*a*. An enlargement showing the dorsal band, and the transverse and revolving striæ.

Fig. 3. A specimen in which moderate wearing or exfoliation has obliterated the marks of the dorsal band, while the transverse striæ are still well preserved.

Bellerophon hyalina.

Page 99.

Fig. 4. An imperfect specimen, natural size.

Bellerophon brevilineatus.

Page 107.

Fig. 5. An imperfect specimen in which the striæ are continued from the umbilicus over the sides of the shell, without interruption.

Fig. 6. An imperfect specimen where the striæ are interrupted on the middle of the side of the volution. This and the preceding are enlarged.

Fig. 7. A copy of the figure given by Mr. Conrad, *ut. cit.* page 107.

Bellerophon rotalinea.

Page 115.

Fig. 8. A lateral view, showing distinct revolving striæ, with faint indications of crenulations.

Bellerophon repertus, n. sp.

Fig. 9. A dorso-lateral view, showing the depressed mesial band and the evenly cancellating striæ of the exterior surface.

Bellerophon patulus.

Page 100.

Fig. 10. A longitudinal section along the median line, showing an extreme thickening of the columellar lip.

Fig. 11. A section of a specimen where the thickened columella is more extreme and slightly different in form and extent. The substance has become crystalline.

Fig. 12. An enlargement of the dorso-lateral portion of a specimen where the surface shows evidence of revolving stria, which are preserved in the furrows between the transverse striæ.

Bellerophon acutilira.

Page 106.

Fig. 13. An enlargement of the surface, showing the acutely arching striæ near the apex of the last volution, and the broader curving of the same near the aperture.

Bellerophon explanatus.

Page 109.

Fig. 14. The dorsal side of the last volution, showing the broad expansion of the peristome and its extension posteriorly.

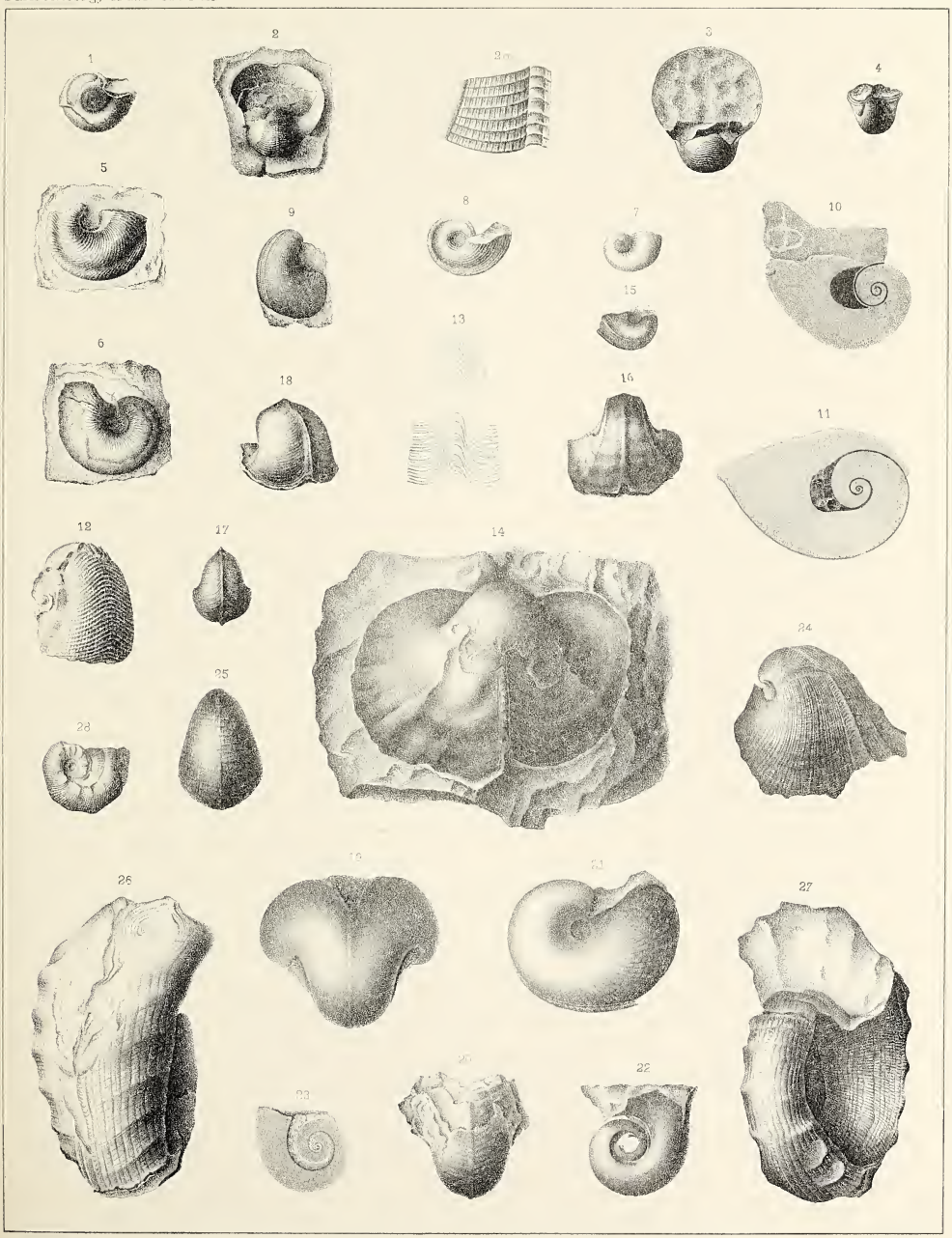
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PLATE XXVI.—*Continued.*

Bellerophon trileratus, juvens ?

Page 118.

Fig. 15. A small imperfect specimen, preserving the tricarinate character, with faint marks of revolving striæ.

Fig. 16. The dorsal side of a specimen exhibiting the tricarinate character, with faint indications of concentric undulations.

Bellerophon nactus.

Page 121.

Fig. 17. The dorsal side of a small specimen which is unusually narrow, with a sharp carina.

Fig. 18. A dorso-lateral view of a broader and more gibbous specimen.

Bellerophon Mæra.

Page 119.

Fig. 19. A cast of the interior, preserving the dorsal carina and showing the expanded peristome.

Fig. 20. A specimen partially preserving the shell, from which the surface-markings have been removed by maceration and solution.

Fig. 21. Lateral view of a large specimen, from which the shell has been partially removed by maceration, and preserving the surface-markings on the outer portion of the volution.

Fig. 22. Lateral view of a cast of the interior.

Fig. 23. A longitudinal section, showing the inner volutions and the gradual thickening of the columellar lip. See, also, plate 25, figure 10.

Bellerophon Leda.

Page 120.

Fig. 24. A dorso-lateral view of a specimen with a simple dorsal band, without revolving striæ, and some incipient longitudinal plications.

Cyrtolites (Cyrtonella) pileolus.

Page 125.

Fig. 25. A dorsal view of a specimen in which the shell is partially preserved.

Porcellia Nais.

Page 127.

Fig. 26. A dorsal view of the specimen, showing the mesial band.

Fig. 27. An oblique ventral view of the preceding specimen.

Fig. 28. The inner volutions of another individual, showing the fine cancellating striæ and lateral nodes.

PLATE XXVII.

Euomphalus (Pleuronotus) Decewi.

Pages 55 and 137.

Fig. 1. A lateral view into the spiral depression, exhibiting the angular form of the aperture, as shown where the shell lies upon its base.

Fig. 2. The umbilical side of the specimen, showing the subquadrate form of the aperture as seen from beneath. The shell becomes thickened and lamellose towards the mouth. The surface-markings are only partially preserved on a part of the outer volution—the remaining portion of the shell having been covered by a Stromatopora.

Fig. 3. The upper side of the shell, showing the depressed spire. The surface-markings are in part preserved, while much of the anterior portion of the last volution is covered by a Bryozoan. The peripheral band is distinctly marked, even where the shell is removed, and the depth of the marginal sinus is shown by the direction of the striæ—the aperture being filled with Stromatopora.

Fig. 4. A section across the centre, as illustrated on plate 15; the upper part of the figure, *a*, cutting the volution (of a cast) near the aperture; *b* showing the form at half a volution preceding; and *c*, the form at a single volution from the aperture.

Euomphalus (Straparollus) clymenioides.

Page 62.

Fig. 5. The upper side of a large specimen, preserving a little more than one volution entire, with the remaining portion crushed and imperfect.

Fig. 6. A smaller specimen, showing a single volution with partial impressions of the remaining volutions. Both the specimens are casts of the interior.

Euomphalus (Straparollus) Hecale var. corpulens.

See page 59.

Fig. 7. The umbilical side of a specimen associated with *Orthis Tioga*, from the Chemung group.

Euomphalus Tioga.

Page 56.

Fig. 8. The umbilical side of a specimen, associated with authentic Chemung fossils at Nichols, Tioga county, N. Y.

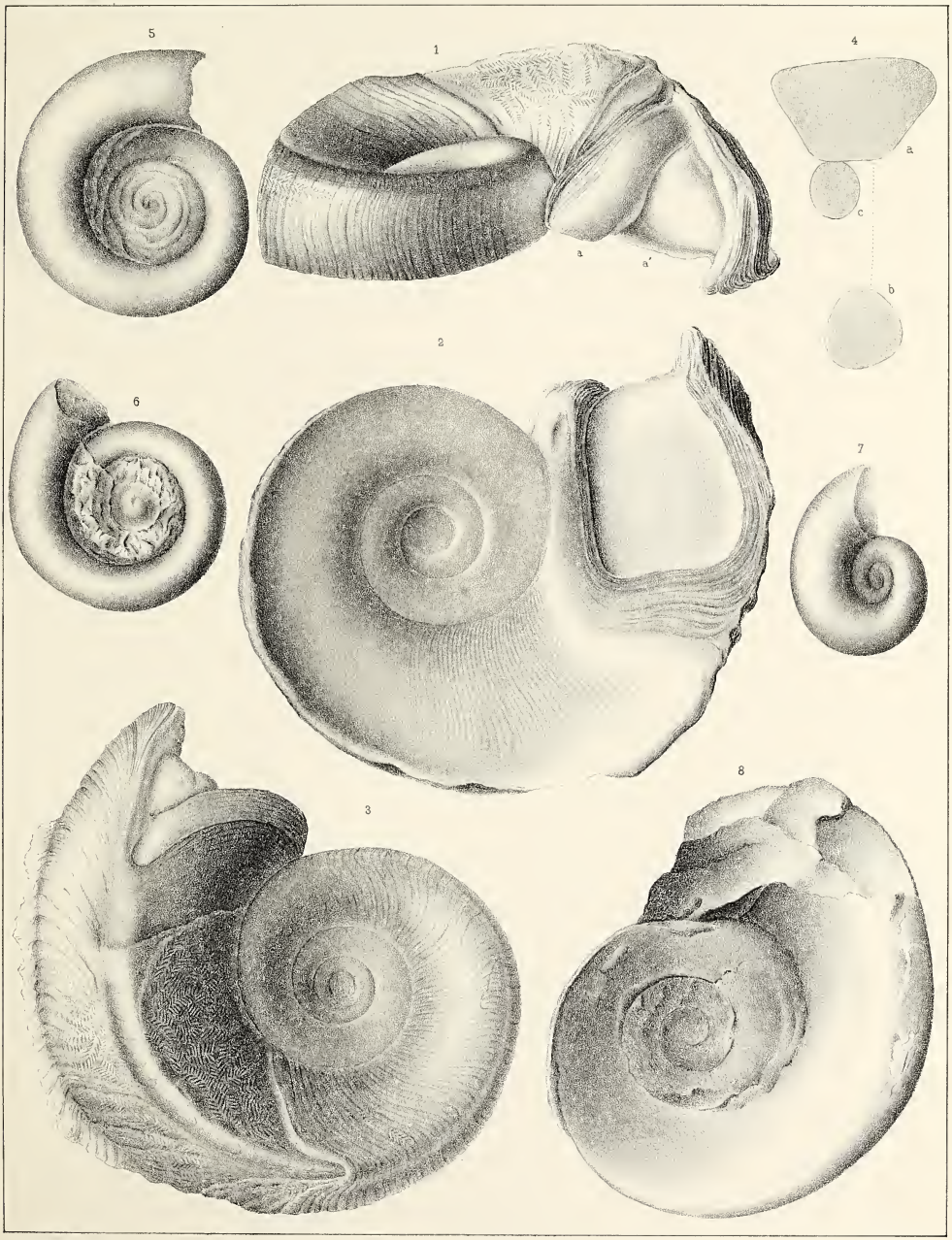
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PLATE XXVIII.

Loxonema sicula.

Page 43.

Fig. 1. A longitudinal section in chert, of a specimen preserving thirteen volutions, enlarged to two diameters.
Fig. 2. A fragment showing the last four volutions with a portion of the aperture, natural size.
Fig. 3. The lower volutions of another specimen, enlarged.

Loxonema robustum.

Page 40.

Fig. 4. A cast of the interior, incomplete at the apex. From the limestone of the Upper Helderberg.

Loxonema subattenuatum.

Page 40.

Fig. 5. A cast of the interior, nearly entire, from the Schoharie grit, Schoharie, N. Y.

Loxonema Hamiltoniæ.

Page 45.

Fig. 6. A specimen in limestone preserving thirteen volutions, the last one imperfect.
Fig. 7. A cast of the interior, in the Goniatite limestone of the Marcellus shale.
Fig. 7*a*. An enlargement of the striæ on several of the volutions for comparison with other species.

Loxonema hydraulicum.

Page 44.

Fig. 8. An enlargement of a fragment preserving three volutions, showing the constricted suture and character of the striæ.

Loxonema rectistriatum.

Page 130.

Fig. 9. A specimen with the apex imperfect, natural size.
Fig. 9*a*. An enlargement of the surface to show more distinctly the character and direction of the striæ.

Loxonema læviusculum.

Page 131.

Fig. 10. A specimen of the ordinary form of the species.

Loxonema læviusculum, var.?

Fig. 11. An elongated, slender form, preserving about nine volutions, associated with the preceding, and without any characteristic markings of the surface.

Loxonema breviculum.

Page 132.

Fig. 12. A longitudinal section of the specimen.

Loxonema postremum.

Page 132.

Fig. 13. An internal cast which preserves marks of the striæ upon the last volution.

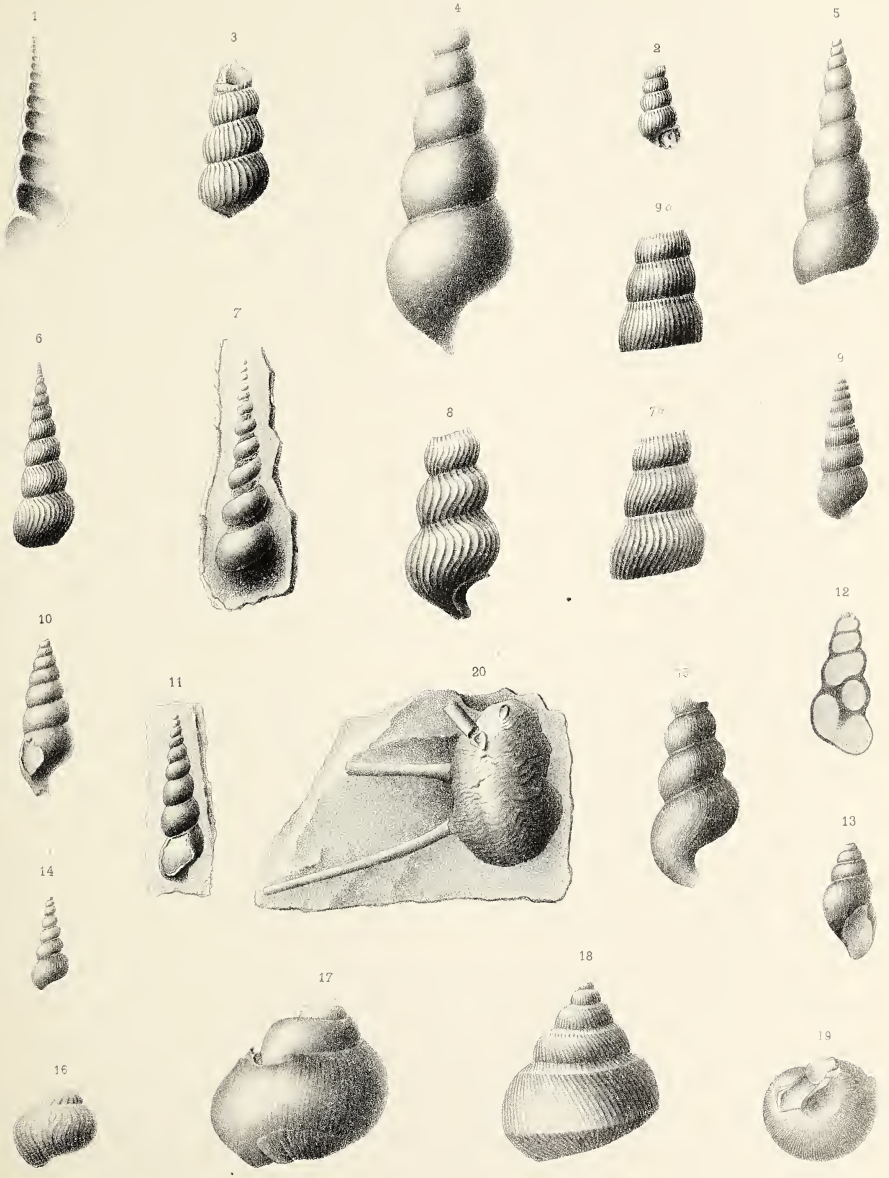
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PLATE XXVIII.—*Continued.*

LOXONEMA MINUSCULA, n. sp.

Fig. 14. A specimen preserving seven volutions, and apparently entire at the base. This form is common in the limestone of the Marcellus shale at Cherry Valley, but the surface-markings are not preserved.

LOXONEMA DELPHICOLA.

Page 47.

Fig. 15. An imperfect specimen of unusually large size and rounded volutions, and preserving the characteristic sutural band.

PLATYOSTOMA TURBINATUM.

Page 27.

Fig. 16. A small specimen with rotund outer volution, having the surface marked by unusually strong and well defined striæ.

HOLOPEA MACROSTOMA.

Page 33.

Fig. 17. A specimen of unusually large size, partially preserving the shell.

CALLONEMA BELLATULUM.

Page 51.

Fig. 18. A young specimen (fig. 10 of plate 14) greatly enlarged, to show the angular character of the outer volution both above and below, while the higher volutions are angulated upon their upper margin.

Fig. 19. The lower side of an individual of medium size, showing an open umbilicus.

PLATYCERAS DUMOSUM var. RARISPINUM.

Page 16.

Fig. 20. The dorsal side of a specimen, preserving the remains of four spines, the lower one being extremely elongate, and still incomplete at the apex.

PLATE XXIX.

Turbo Shumardii.

Page 135.

Fig. 1. A small specimen showing the aperture, with the peristome very nearly entire, while the thickened columellar lip is completely preserved.

Fig. 2. The opposite side of the same specimen, showing the oblique nodes and the angular peripheral carina.

Fig. 3. Dorsal view of a large individual, showing the elevation of the spire, and the strong oblique nodes, which, in some instances, invade the peripheral carina, giving an undulating outline.

Fig. 4. The summit of the preceding specimen, showing the volutions and the form and character of the nodes.

Naticopsis comperta, n. sp.

Fig. 5. The posterior side showing the aperture, with the peristome nearly entire.

Fig. 6. The anterior side of the preceding shell. The specimen is from the Upper Helderberg limestone, and enlarged to two diameters.

Euomphalus [Pleuronotus] Decewi.

Pages 55 and 137.

Fig. 7. The upper side of the spire of a specimen of medium size. The shell is coarsely striated, and, with the peripheral band, well preserved on the outer volution. From the Upper Helderberg limestone of Ohio. Collection of Dr. J. S. Newberry.

Platyceras dumosum.

Page 14.

Fig. 8. A very coarse, strong specimen, mainly an interior cast, preserving a few strong spines. The specimen is from the Schoharie grit at Schoharie—a position in which this fossil is rarely found.

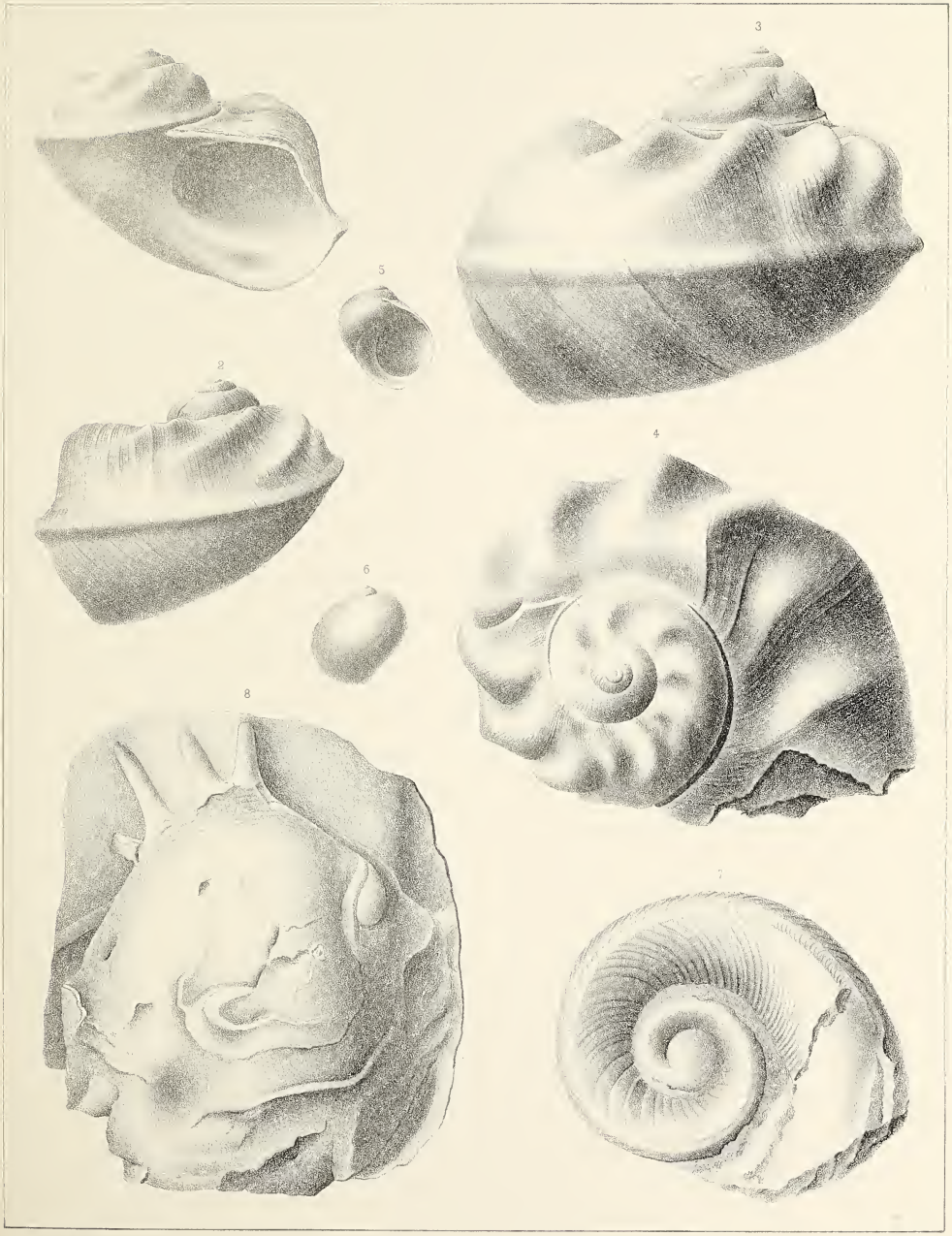

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PLATE XXX.

PLEUROTOMARIA ADJUTOR.

Page 80.

Fig. 1. A figure of the peripheral band, and the striæ above and below, enlarged three diameters.

PLEUROTOMARIA ITYS.

Page 76.

Fig. 2. A figure of the peripheral band, and the striæ above and below, enlarged three diameters.

PLEUROTOMARIA INSOLITA.

Page 81.

Fig. 3. The mesial band and adjacent striæ, enlarged five diameters.

PLEUROTOMARIA NITELLA.

Page 85.

Fig. 4. An enlargement of the mesial band, showing the bicarination on each side, with the simple sharp striæ; four diameters.

PLEUROTOMARIA ITYS var. TENUISPIRA.

Page 87.

Fig. 5. The peripheral band, with the adjacent striæ, enlarged four diameters.

PLEUROTOMARIA CAPILLARIA, var.

Page 87.

Fig. 6. An enlargement of the peripheral band, showing a single revolving line and more distant striæ than the typical forms of the species. See figures 20 and 21.

PLEUROTOMARIA CAPILLARIA.

See page 87.

Fig. 7. An enlargement from the ordinary form of this species, showing a striate peripheral band, and closely arranged striæ above and below.

PLEUROTOMARIA SULCOMARGINATA.

Page 69.

Fig. 8. An enlargement showing a plain peripheral band with the striæ carinated above and below; two diameters.

Fig. 9. A similar enlargement from another specimen, showing a striated peripheral band, with the striæ uninterrupted above and marked by a very faint carination below; three diameters.

PLEUROTOMARIA LUCINA.

Page 67.

Fig. 10. The surface of a specimen from the Hamilton group, showing the character of the striæ on the two outer volutions—the peripheral band on the last one being marked by fine transverse striæ, while the one preceding it has both transverse and revolving striæ; natural size.

Fig. 11. The surface of a specimen from the Upper Helderberg limestone, showing the character of the peripheral band, with the strongly cancellated striæ above and below; enlarged two diameters.

PLEUROTOMARIA QUADRILIX.

Page 86.

Fig. 12. An enlargement of the peripheral band and surface striæ; two diameters.

PLEUROTOMARIA TRILIX.

Page 79.

Fig. 13. An enlargement of the peripheral band and adjacent striæ, giving the characteristics of the surface; three diameters.

TROCHUS (PALÆOTROCHUS) KEARNEYI.

Page 133.

Fig. 14. The dorsal side of a specimen which preserves the striæ upon the last volution; the upper volutions being denuded of the shell, and the apex incomplete.

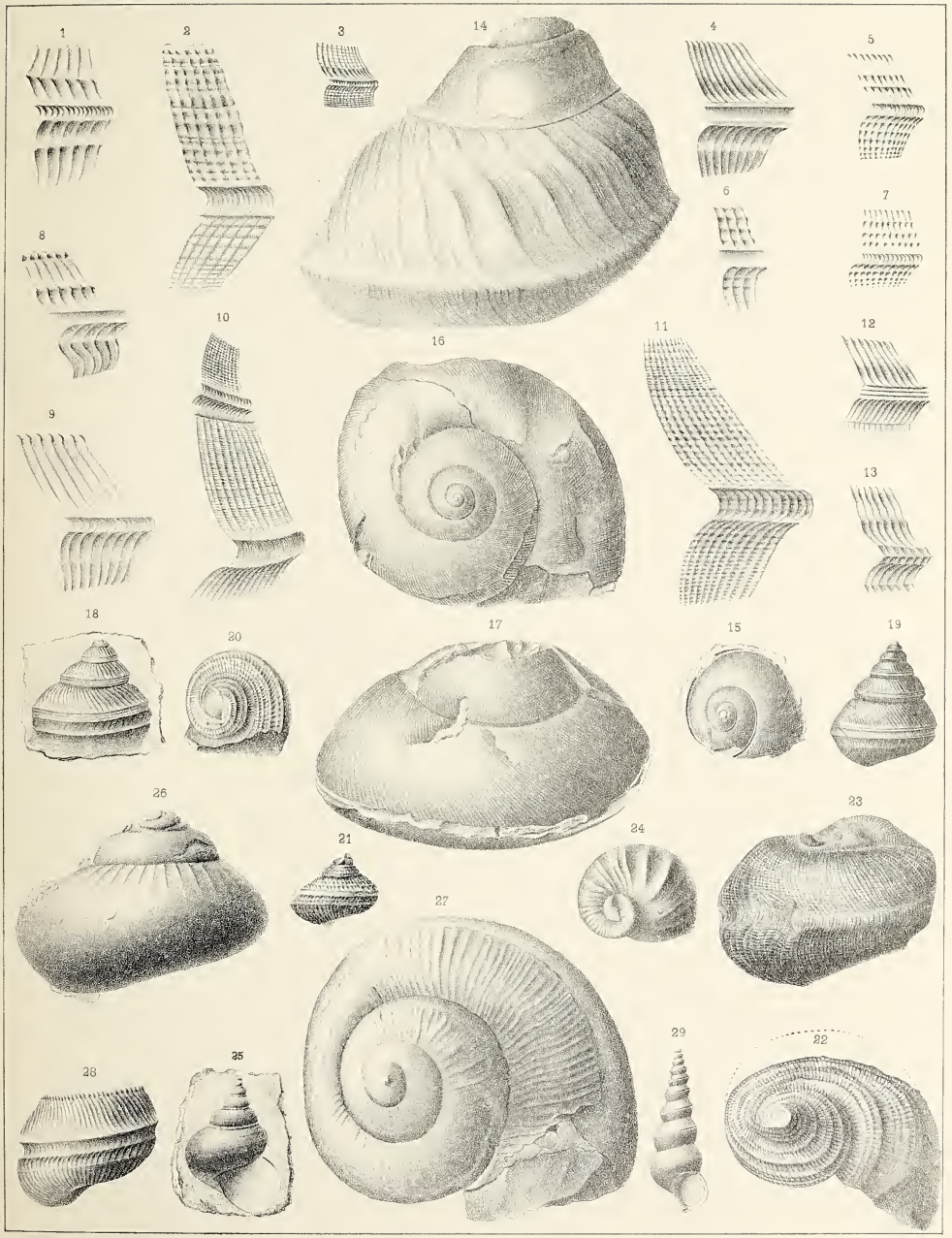
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PLATE XXX—*Continued.*

Pleurotomaria filitexta.

Page 73.

Fig. 15. The upper side of a small individual.

Fig. 16. A large individual which is vertically compressed and somewhat distorted.

Fig. 17. A large specimen, imperfect in the spire, which has been laterally compressed, giving an exaggerated elevation to the volutions. These last two figures are from unusually large individuals of the species.

Pleurotomaria quadrilix.

Page 86.

Fig. 18. A lateral view, showing the form of the shell and the character of the peripheral band. The last volution is incomplete. Enlarged to three diameters.

Pleurotomaria nitella.

Page 85.

Fig. 19. A lateral view showing the form of the spire, the character of the peripheral band and striæ (which are farther enlarged in fig. 4), enlarged two diameters.

Pleurotomaria capillaria, var. rustica, n. var.

Page 87.

Fig. 20. The upper side of an imperfect specimen, showing the great expansion of the outer volution.

Fig. 21. A lateral view of a similar form, which shows a much less elevation of the spire than the ordinary forms of the species.

Fig. 22. A very large and much expanded specimen, which is apparently only an exaggerated form of this variety.

These all differ from the typical forms of *P. capillaria* in the comparatively less elevated spire and greater expansion of the outer volution.

Pleurotomaria Lucina.

Page 67.

Fig. 23. The outer volution, showing the spiral band without defined limitation, and near the aperture the mark of a fracture during the life of the animal, followed by some irregularity in the subsequent mode of growth.

Pleurotomaria Lucina?

See page 67.

Fig. 24. A specimen of irregular form and growth, which has the aspect of a dwarfed and exaggerated variety of *P. arata* or *P. Lucina*, preserving some features of both. The striæ, so far as preserved, have the character of the latter species, while the costæ present much similarity to the former.

Pleurotomaria Itys, var. tenuispira.

Page 87.

Fig. 25. The posterior side of the specimen, showing the form of the aperture and rapidly attenuating spire, enlarged two diameters. See, also, figure 5.

Pleurotomaria arata.

Page 64.

Fig. 26. A very rotund form of this species. The specimen is a cast of the interior, preserving the remains of the concentric costæ upon the upper side of the last volution.

Fig. 27. The upper side of an extremely depressed specimen, partially preserving the shell in a macerated condition, and showing the strong concentric costæ.

Murchisonia micula.

Page 93.

Fig. 28. An enlargement of the last volution, showing the peripheral band, with the impressed line below, and also the subcarinate feature of the upper margin of the volution.

Murchisonia intercedens.

Page 92.

Fig. 29. The posterior side, showing the subcentral peripheral band and nearly entire aperture; natural size.

PLATE XXXI.

TENTACULITES ARENOSUS.

Page 166.

Fig. 1. An internal cast.

Fig. 2. Enlargement of the same. The lower end shows a fragment of the shell and its relative thickness.

TENTACULITES SCALARIFORMIS.

Page 167.

Fig. 3. A specimen from cherty limestone of the Upper Helderberg group.

Fig. 4. Enlargement of the same, showing the form of the annulations; the surface has obscure encircling striæ not well indicated on the figure.

Fig. 5. A specimen which retains the shell.

Fig. 6. Enlargement of the same, showing the annulations and the encircling striæ.

Fig. 7. A specimen of somewhat different form.

Fig. 8. Enlargement of the same.

Fig. 9. A farther enlargement, showing the irregularity of the striæ and their existence on the annulations and in the depressions between.

Fig. 10. Enlargement of a specimen which shows an inequality in the strength and distance of the annulations.

Fig. 11. Enlargement of a specimen in more compact limestone, having the shell removed by the fracture of the rock, and showing its thickness.

TENTACULITES GRACILISTRIATUS.

Page 173.

Figs. 12–14. Enlargement (to eight diameters) of three specimens, showing the difference in form and surface characters. See plate 31 A.

TENTACULITES BELLULUS.

Page 169.

Fig. 15. A specimen showing the general features of the species.

Fig. 16. Enlargement of the same, showing the form of the annulations and the encircling striæ.

Fig. 17. Enlargement of a specimen showing similar features. The shell is broken at a point near the middle, showing its thickness.

Fig. 18. A further enlargement of the upper portion, showing the more abrupt slope of the annulations on the apical side (lower side of figure).

TENTACULITES ATTENUATUS.

Page 170.

Fig. 19. A gutta-percha impression from a fragment of the rock, showing a group of the shells.

Fig. 20. An enlargement of one of the individuals from the same piece of rock.

TENTACULITES SPICULUS.

Page 172.

Fig. 21. A gutta-percha impression from a fragment of rock from the Chemung group. *South of Ithaca, N. Y.*

Figs. 22, 23. Enlargements of two individuals from the above specimen. These show a slight difference in the form of the annulations.

Fig. 24. A gutta-percha impression from the weathered surface of a fragment of rock of the Chemung group. *Cortland, N. Y.*

Fig. 25. Enlargement of a specimen, from the same block, which is more slender in form than those on 21, but showing similar surface characters.

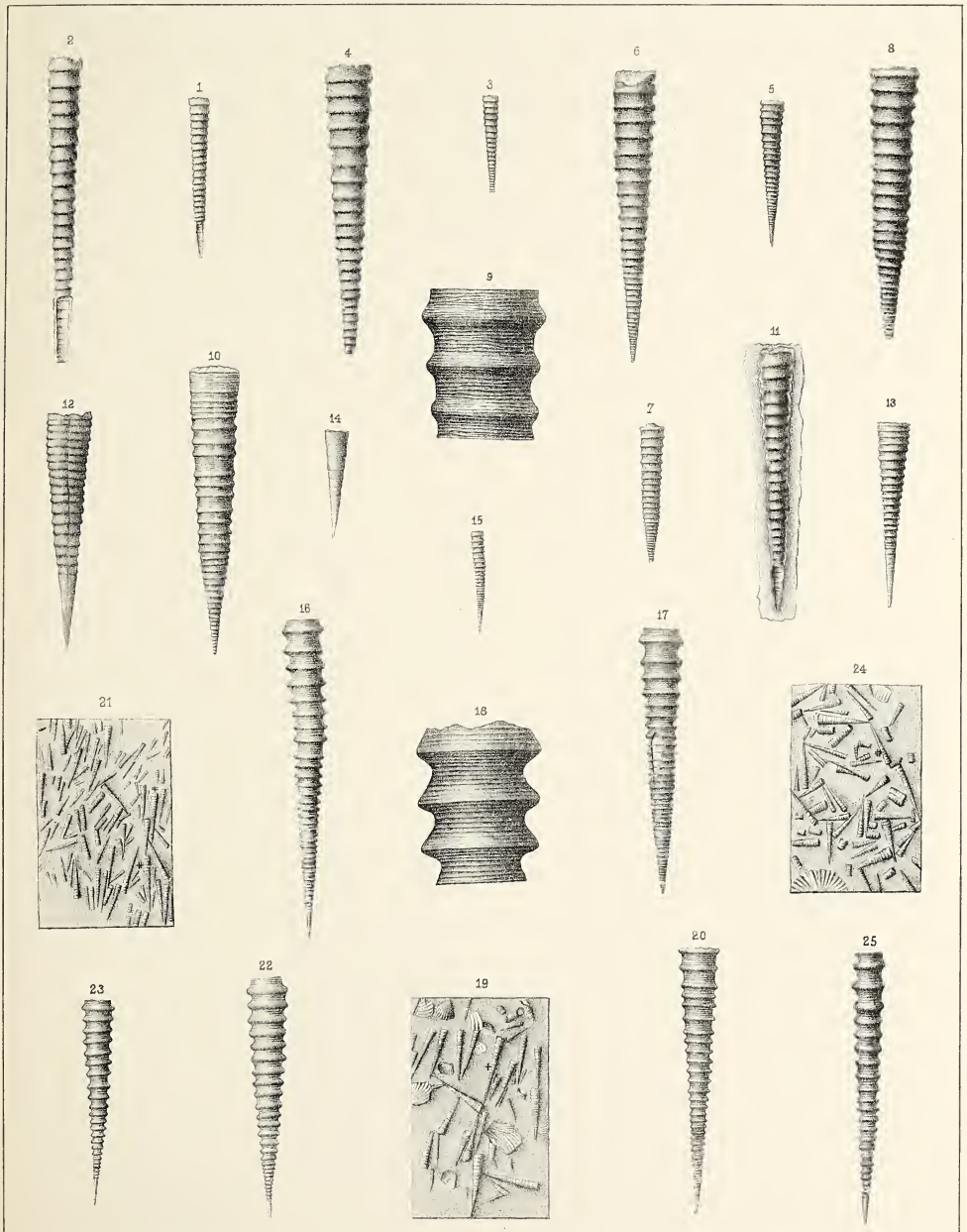
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PLATE XXXI A.

STYLIOLA FISSURELLA.

Page 178.

Fig. 1. A fragment of slate with numerous crushed specimens of the fossil, enlarged to three diameters.

Figs. 2–6. Individuals from the surface of the slate, showing the variety of form and surface-markings; fig. 2 being strongly striate longitudinally; fig. 3 showing transverse and longitudinal striæ; and fig. 4 preserving only transverse striæ; while figs. 5 and 6 are without visible striæ under an ordinary lens. All the preceding figures are from the Marcellus shale. Figs. 2–6 are enlarged to six diameters.

Fig. 7. A fragment of the Genesee slate covered with *Styliola fissurella*, enlarged to three diameters.

All the following figures are enlarged to six diameters unless otherwise indicated.

Fig. 8. A crushed specimen showing obscure transverse striæ; the apex acute.

Fig. 9. A crushed specimen without visible transverse striæ, and with the extremity bulbiform.

Fig. 10. A specimen in its natural proportions, the margin of the aperture broken away on one side. The surface is obscurely marked by transverse striæ, and the extremity slightly bulbiform.

Fig. 11. An individual which is apparently contracted near the aperture, with the surface faintly striate concentrically, and the apex acute.

Fig. 12. A smaller form similar to the preceding, without visible transverse striæ.

Fig. 13. A larger compressed specimen with obscure transverse striæ.

Fig. 14. A portion of an individual where the transverse striæ are more closely arranged, and more conspicuous.

Fig. 15. An individual of large size, where the lower part of the tube is essentially smooth, or preserving only obscure concentric striæ, while towards the aperture these striæ become much stronger, and are cancellated by longitudinal striæ; the latter being visible only so far as shown in the figure. All the figures from 11–15 inclusive have no perceptible expansion at the apex.

Fig. 16, *a*, *b*, *c*. Specimens showing an apparently intermittent mode of growth.

Fig. 17. A specimen showing the insertion of one individual within another; the outer broken margin being of the shell, and the intermediate portion the filling of mineral matter between the two. It is probable that some of the irregular specimens referred to intermittent growth may be due to conditions similar to fig. 17; but in other examples it is clearly the mode of growth.

Figs. 18, 19. Two small individuals of regular form and acute apices, with faint, transverse undulations, which are scarcely defined as striæ.

Fig. 20. Three individuals lying in juxtaposition and preserving their natural proportions; two of them show evidence of intermittent growth, and are contracted near the aperture, while the third one is simple. The surfaces are marked by faint undulations or obsolete striæ.

Fig. 21. A short, broad form, the breadth increased by compression.

Fig. 22. A short, broad specimen with the aperture entire. From the Genesee slate. *Lexington, Indiana.*

Figs. 23, 24. Two individuals of slightly different shape (fig. 23 being a little more compressed), both of which have the surface distinctly cancellated by fine, longitudinal and transverse striæ. Fig. 24 is slightly bulbiform at the extremity, while fig. 23 is acute.

Fig. 25. A fragment showing the cleavage surface of a calcareous layer in the Genesee slate, which is chiefly composed of STYLIOLA with a few TENTACULITES. Natural size. *Cayuga creek, Erie county, N. Y.*

Fig. 25 *a*. A polished, translucent section from a calcareous layer in the Marcellus shale, showing the transverse and longitudinal sections of STYLIOLA; enlarged to three diameters. *Cherry Valley, N. Y.*

Figs. 26, 27 and 28 are very minute, slender forms of STYLIOLA enlarged to six diameters, as in the preceding and following figures of this species. The apices are slightly bulbiform; and on figure 27 there are obsolescent striæ, while figures 26 and 28 are smooth. From the compact layer composed of the shells of Styliola, in the Genesee slate. *Cayuga creek, Erie county, N. Y.*

The figures from 7 to 28 inclusive, except 25 *a*, are from the Genesee slate. The figures 29 and 30, and 33–36, are from the shales in the lower part of the Hamilton group, above the Marcellus shale.

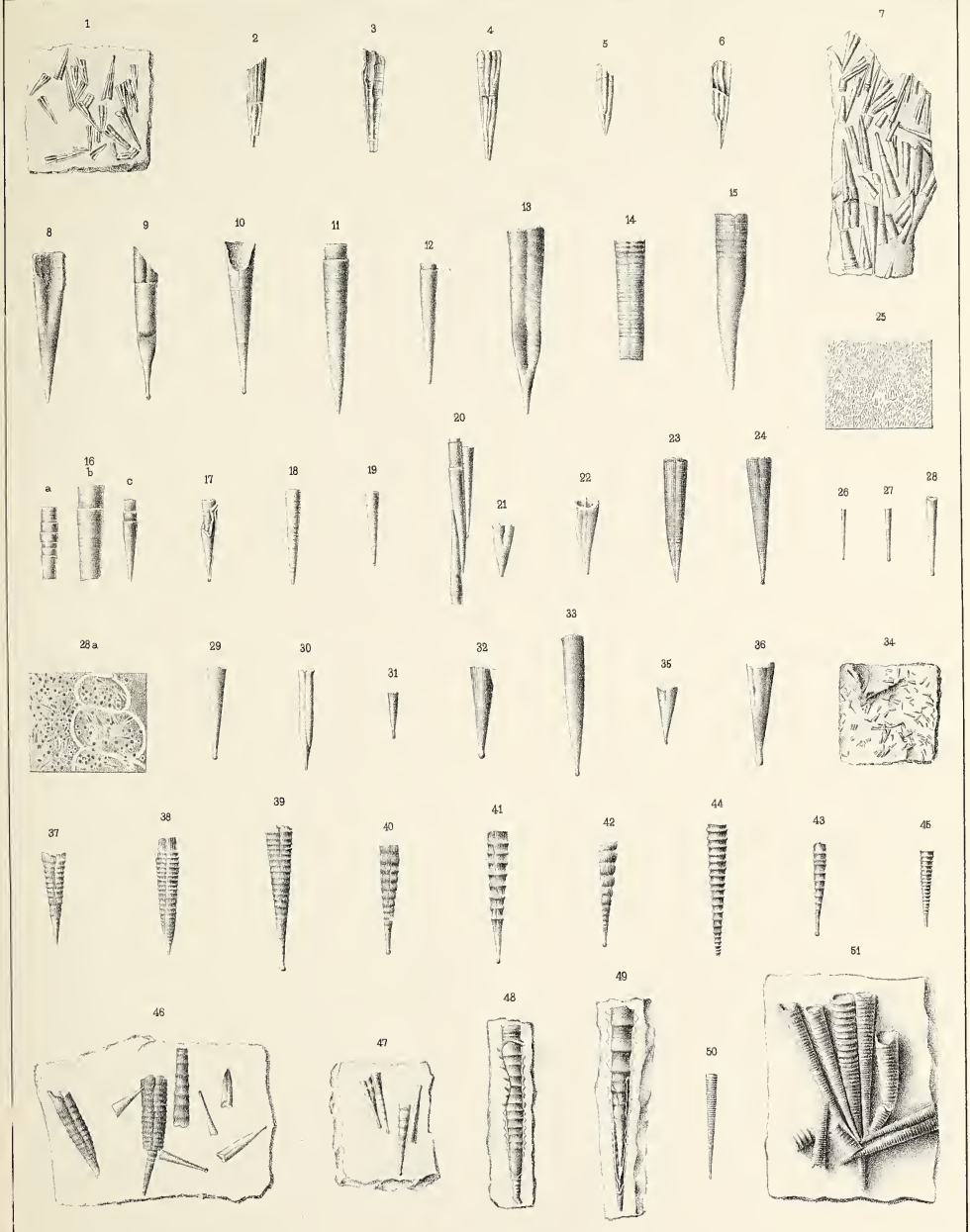
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PLATE XXXI A—*Continued.*

Styliola fissurella.

Page 178.

Figs. 29, 30. Two individuals from the soft calcareous shales of the Hamilton group, presenting the prevailing forms in that horizon, with surfaces entirely smooth. Figure 29 is slightly bulbiform at the apex; figure 30 is acute, presenting a depressed line along the middle of its length, which is due to pressure.

Figs. 31, 32. Two individuals, enlarged to six diameters, showing strong longitudinal striæ, and faint, transverse annulations; the smaller one is slightly expanded at the apex, and the larger one distinctly bulbiform. These specimens are from the calcareous band in the Marcellus shale at Cherry Valley, and are referred to *S. fissurella* var. *strigata.*

Fig. 33. A more elongate form, where the striæ are obsolescent, being barely perceptible under a strong lens, and appearing smooth under ordinary observation. The apex is distinctly bulbiform. This form occurs associated with those of figures 29 and 30, in the calcareous shales of the Hamilton group.

The forms illustrated in figures 29, 30 and 33 are referred to *S fissurella* var. *obsolescens.* See page 180.

Styliola obtusa.

Page 182.

Fig. 34. A fragment of shale covered with individuals of this form. Natural size.

Fig. 35. A small specimen with a scarcely perceptible bulbiform apex.

Fig. 36. A larger individual with the apex bulbiform. The surface is entirely smooth. From the shales of the Hamilton group.

Tentaculites gracilistriatus.

Page 173.

Figs. 37, 38. Specimens of similar character with the apices acute. The specimen, figure 38, is somewhat contracted near the aperture, and free from annulations.

Figs. 39–42. Specimens of similar character, varying in the proportional number and distance of the annulations, and in the comparative length of the smooth part of the tube towards the apex. The apices are all bulbiform. From the soft shales of the lower part of the Hamilton group.

Fig. 43. A similar form, where the annulations are more acute, and somewhat unequally distant, with the apical portion marked only by longitudinal striæ.

Fig. 44. A specimen, in the compact limestone of the Marcellus shale, where the annulations are sharply defined and continuing to the extremity, so far as preserved.

Fig. 45. A small specimen from the Genesee slate, where the annulations are continued nearly to the apex.

Fig. 46. A fragment of shale, preserving Tentaculites and Styliola upon its surface, and presenting the usual conditions, as they occur in the shales of the lower part of the Hamilton group; enlarged to six diameters.

Fig. 47. A small fragment of shale with the apical portions of *Tentaculites gracilistriatus,* which preserve only slight undulations of the surface, with a single smooth Styliola.

Tentaculites bellulus.

Page 169

Fig. 48. A specimen partially denuded of the shell, the thickness of which is shown on each side of the figure. The annulations are irregular, and the tube contracted towards the aperture; enlarged to two diameters.

Fig. 49. An individual partially denuded of the shell, and showing distant and irregular annulations. The apex has become solidified from organic deposition, as shown in the lower part of the figure.

Fig. 50. The apical portion of a specimen, where the annulations are regular and closely arranged throughout. The figure represents the specimen enlarged to two diameters, and the surface is marked by about sixty annulations.

Fig. 51. A group of individuals of this species, as they occur on the surface of the shale; enlarged to three diameters.

PLATE XXXII.

Coleolus crenatocinctum.

Page 188.

Fig. 1. A fragment in chert, where the shell is crystallized in silica; natural size. The section below shows the diameter of the tube, and proportional thickness of the shell.

Fig. 2. An enlargement from a small fragment of another individual in chert, where the surface characters are preserved.

Fig. 3. An elongate tubular form in limestone, which apparently belongs to this genus and species.

Fig. 4. A fragment of similar character with the preceding, but more curved and irregular.

Coleolus tenuicinctum.

Page 185.

Fig. 5. A small individual which is crushed at the larger end. Owing to the position of the individual, the striæ appear to be directly transverse.

Fig. 6. A larger flattened specimen, which is fractured longitudinally along the centre of the exposed surface The striæ are oblique. Figure enlarged.

Fig. 7. An individual with finely striated surface, the upper end of which is partially inclosed in a striated fold of shale. The striæ on the shale are due to slipping or concretionary action. Enlarged.

Fig. 8. A small specimen in its natural proportions, enlarged two diameters, showing the slightly expanding cylindrical tube, with its characteristic annulations.

Fig. 9. A further enlargement of a portion of the specimen figure 8, showing the oblique annulations and fine longitudinal striæ.

Clathrocœlia eborica.

Page 204.

Fig. 10. The exposed face of the specimen in shale, showing the arching septa (or laminæ), with the longitudinal lines obscurely indicated.

Hyolithes ligea.

Page 195.

Fig. 11. The ventral surface of a specimen, showing the faintly impressed sides with a more strongly convex centre.

Fig. 12. View of the dorsal side, showing the deeply concave margin of the aperture.

Fig. 13. Profile view of the same, showing the relative convexity of the two sides of the specimen.

Fig 14. The dorsal surface of a specimen. From the Schoharie grit.

Fig. 15. A transverse section of the specimen, figure 12.

Fig. 16. A smaller individual of the same species (*i*) which has been somewhat irregular in its mode of growth.

Hyolithes principalis.

Page 196.

Figs. 17–19. Three views of an imperfect specimen, showing the rapid increase in diameter, the relative convexity of the opposite sides, and the arching of the lip of the aperture on the convex side of the shell.

Fig. 20. The dorsal surface of a large specimen supposed to belong to this species, but showing more angularity along the middle, and a different ratio of increase in width.

Fig. 21. A transverse section of the specimen, figure 17.

(HYOLITHIDÆ)

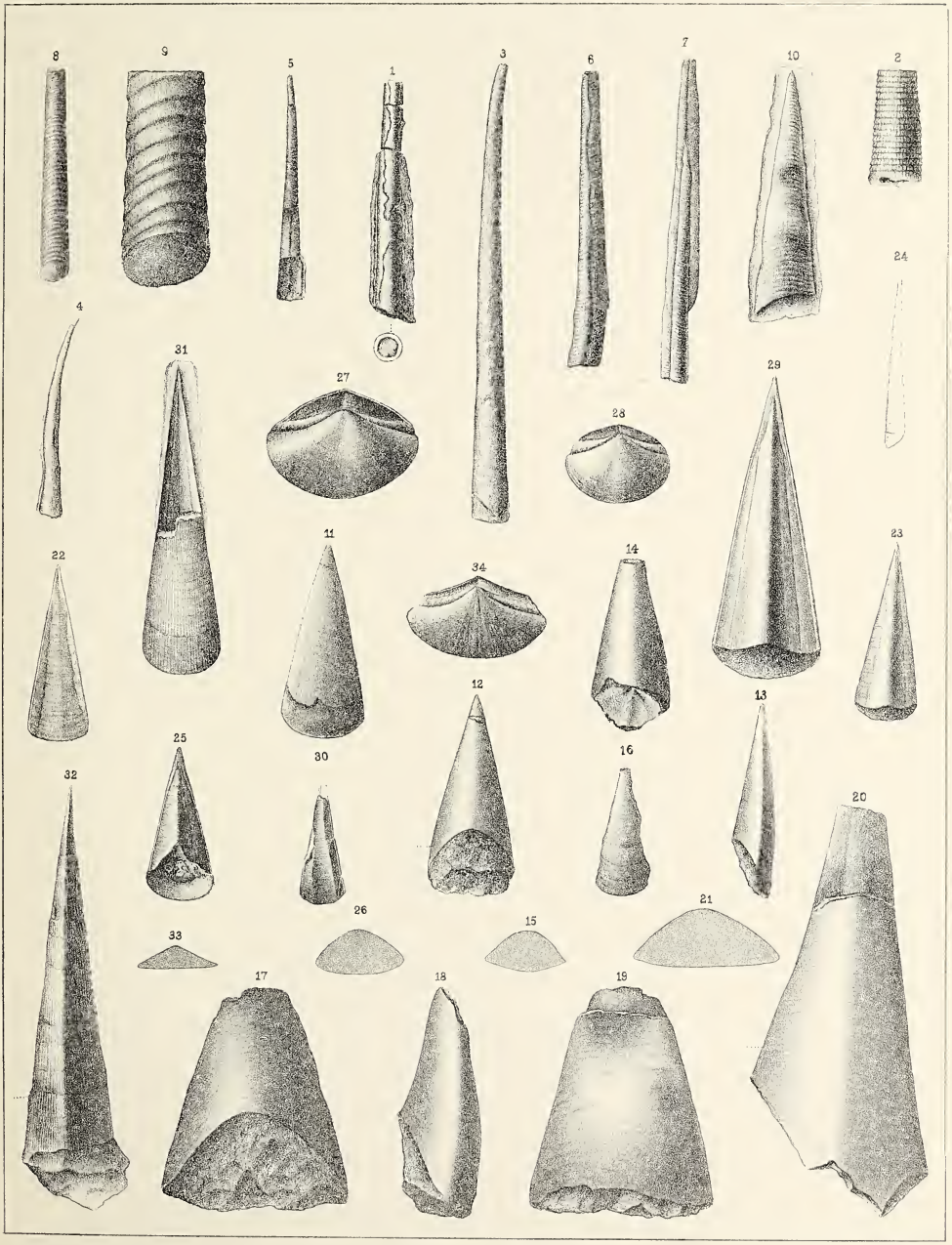

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PLATE XXXII.—*Continued.*

Hyolithes aclis.

Page 197.

Fig. 22. The ventral side of a large specimen fractured by compression.

Fig. 23. The opposite side of the same.

Fig. 24. Profile outline of the same, showing the convexity.

Fig. 25. A more expanded and comparatively shorter form. The cavity contains the head of a small Dalmanites.

Fig. 26. A transverse section of a specimen of this species.

Figs. 27, 28. Two different forms of operculum associated with the above, and supposed to belong to the same species.

Fig. 29. An enlarged figure from a specimen of angular form, showing obscure longitudinal striæ, and distinct suture-like lines. In the *Illustrations of Devonian Fossils* this figure (as fig. 9 of Plate XXVII) is erroneously referred to *H. striatus*.

Hyolithes aclis, var. petaloidea.

Page 197.

Fig. 30. The ventral side, with the central portion depressed, and limited by a distinct angularity on each side.

Hyolithes striatus.

Page 199.

Fig. 31. An enlargement of a specimen to three diameters, showing the ventral surface with longitudinal striæ, and the impression of the angular side with characteristic impressed lines.

Fig. 32. An enlargement of the dorsal surface to six diameters, showing the longitudinal striæ.

Fig. 33. A transverse section of a specimen of this species.

Fig. 34. An operculum found associated with the specimens, and supposed, from its form and radiating striæ, to belong to the species.

PLATE XXXII A.

Coleoprion? tenuis.

Page 184.

Fig. 1. A specimen in shale, natural size.

Fig. 2. A portion of the same enlarged, showing the longitudinal groove and oblique striæ.

Coleolus crenatocinctum.

Page 188.

Fig. 3. A specimen in which the transverse striæ or annulations are barely perceptible.

Fig. 4. A piece of limestone preserving portions of several individuals of this species, which are broken longitudinally, showing the interior filling and the thickness of the shell.

Coleolus? Mohri.

Page 189.

Fig. 5. A fragment of an individual imbedded in limestone, showing, in part, the interior cast with the crystalline shell, and the faintly striated impression of the exterior in the lower part of the specimen.

Coleolus tenuicinctum.

Page 185.

Fig. 6. A specimen, natural size, which is compressed and longitudinally grooved from fracture, at both extremities, while the central portion is more faintly striated, and shows no longitudinal groove.

Fig. 7. An enlargement of a fragment which is strongly striated at one end with a longitudinal depression; the remaining portion being faintly striated, and preserving its natural proportions.

Fig. 8. Another individual, enlarged, showing the smaller extremity much flattened, strongly striated and longitudinally grooved. The central portion is more distinctly striated, without longitudinal groove, while the larger extremity has a slight longitudinal groove and stronger annulations.

Fig. 9. A fragment enlarged. The annulating striæ are regular and sharply defined, and the longitudinal groove is evidently due to fracture. The longitudinal striæ are likewise shown in the specimen.

Fig. 10. An imperfect specimen, natural size, showing fine, equal and obliquely-annulating striæ.

Coleolus aciculum.

Page 187.

Fig. 11. An individual, natural size, which is flattened upon the surface of a slaty lamina; the lower portion showing a longitudinal line of fracture, with obscure indications of transverse striæ near the aperture.

Fig. 12. A similar specimen to the preceding, but less distinctly preserved.

Fig. 13. A fragment of slate, preserving a crushed specimen of this species, and a young, or the smaller extremity of another individual.

Fig. 14. A small or imperfect individual of this species from the green shale of the Portage group, in which occurred the original of *Orthoceras aciculum*.

Fig. 15. A fragment of what appears to be the same species, preserving obscure transverse striæ. The specimen is preserved in a soft olive shale. The transverse striæ in this figure and in figure 11 are much too strongly represented.

Fig. 16. A crushed and imperfect individual, apparently of this species. The lower part of the imprint shows obscure, cancellating striæ.

Coleolus (Dentalium?) aciculatum.

Page 190.

Fig. 17. A fragment of limestone, preserving portions of two individuals. Natural size.

Fig. 18. A part of an individual enlarged, showing the cast of the interior and the thickness of the shell.

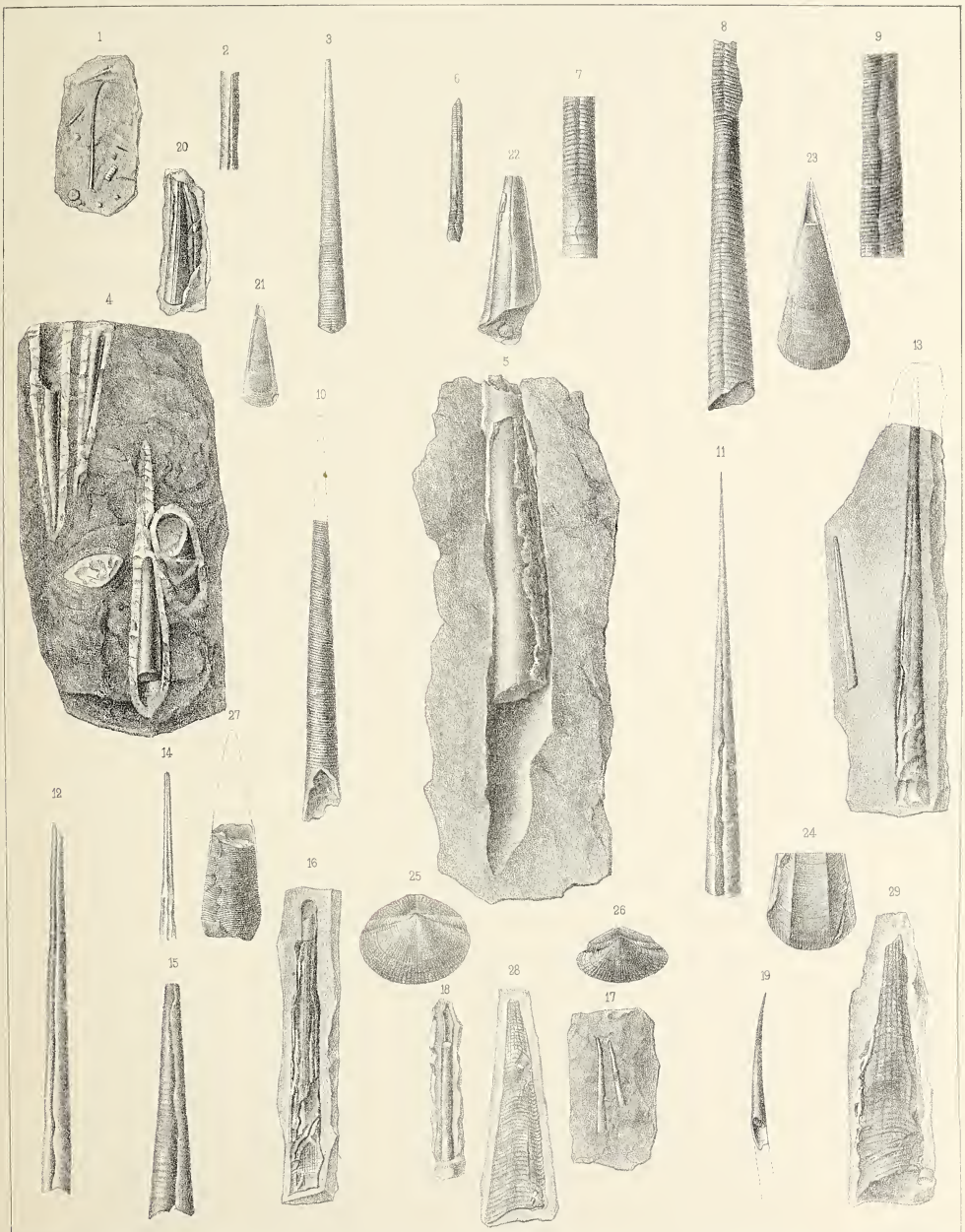
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PLATE XXXII A—*Continued.*

Coleolus? gracilis.

Page 190.

Fig. 19. A fragment of an individual, showing the ordinary form and the natural curvature of the shell.

Hyolithes triliratus.

Page 201.

Fig. 20. The dorsal side of an imperfect individual, imbedded in the rock, showing a double groove along the dorsal angle.

Fig. 22. A large individual, showing a distinct groove along the dorsal angle, with the lateral angles crushed, and the shell partially separated.

Hyolithes aclis.

Page 197.

Fig. 21. The ventral side of a small individual, which is compressed near the margins, and the sides partially separated at what appear to be, the suture lines (= var. *petaloidea*).

Fig. 23. The ventral side of a specimen preserved in the coarser shale, and showing longitudinal striæ very distinctly near the lower margin.

Fig. 24. The inner surface of the shell on the ventral side, showing the longitudinal and transverse striæ, and also the longitudinal lines of apparent fracture from compression (= var. *petaloidea*).

Fig. 25. An enlargement of an operculum, supposed to belong to this species, showing the surface characters more in detail than figure 27 of plate 32.

Hyolithes striatus.

Page 199.

Fig. 26. An enlargement of an operculum, supposed to belong to this species.

Hyolithes singulus.

Page 202.

Fig. 27. The lower part of an individual of this species, showing the character of the surface-markings, and obtusely triangular form of the shell.

Clathrocœlia eborica.

Page 204.

Fig. 28. The exposed flat side of a specimen, showing the arching and recurved septal markings, with some of the longitudinal striæ.

Fig. 29. A larger individual than the preceding, showing the arching, septal markings and the longitudinal striæ. The shell, in the lower part, is crushed, and appears to be separated in distinct arching laminar rings.

PLATE XXXIII.

Conularia undulata.

Page 208.

Figs. 1, 2. Two views of a slightly compressed cast of an imperfect specimen, showing the expansion, and the general characters of the species.

Figs. 3, 4. The opposite sides of a larger cast, somewhat compressed, showing a more gradual tapering form, with the deeply concave septum truncating the apex.

Fig. 5. From a gutta-percha impression in the natural mold, the specimen showing a rapidly tapering shell, as in figures 1 and 2, with crowded striæ at the lower extremity. The surface is marked by the imprints of several Discina which have been attached to the surface. It is possible that further examination, with a larger number of specimens, may prove the form shown in figures 1, 2 and 5 distinct from that of figures 3 and 4.

Fig. 7. A diagram giving the form of a transverse section of the specimen figures 1 and 2.

Conularia continens.

Page 212.

Fig. 6. An enlargement of the surface from a well-preserved specimen.

Conularia crebristriata.

Page 210.

Fig. 8. A fragment in shale, showing a very gradual expansion of the cone, and very fine crowded transverse striæ.

Fig. 9. Enlargement of the surface, showing the transverse striæ apparently destitute of nodes. This appearance may be due to partial exfoliation of the shell.

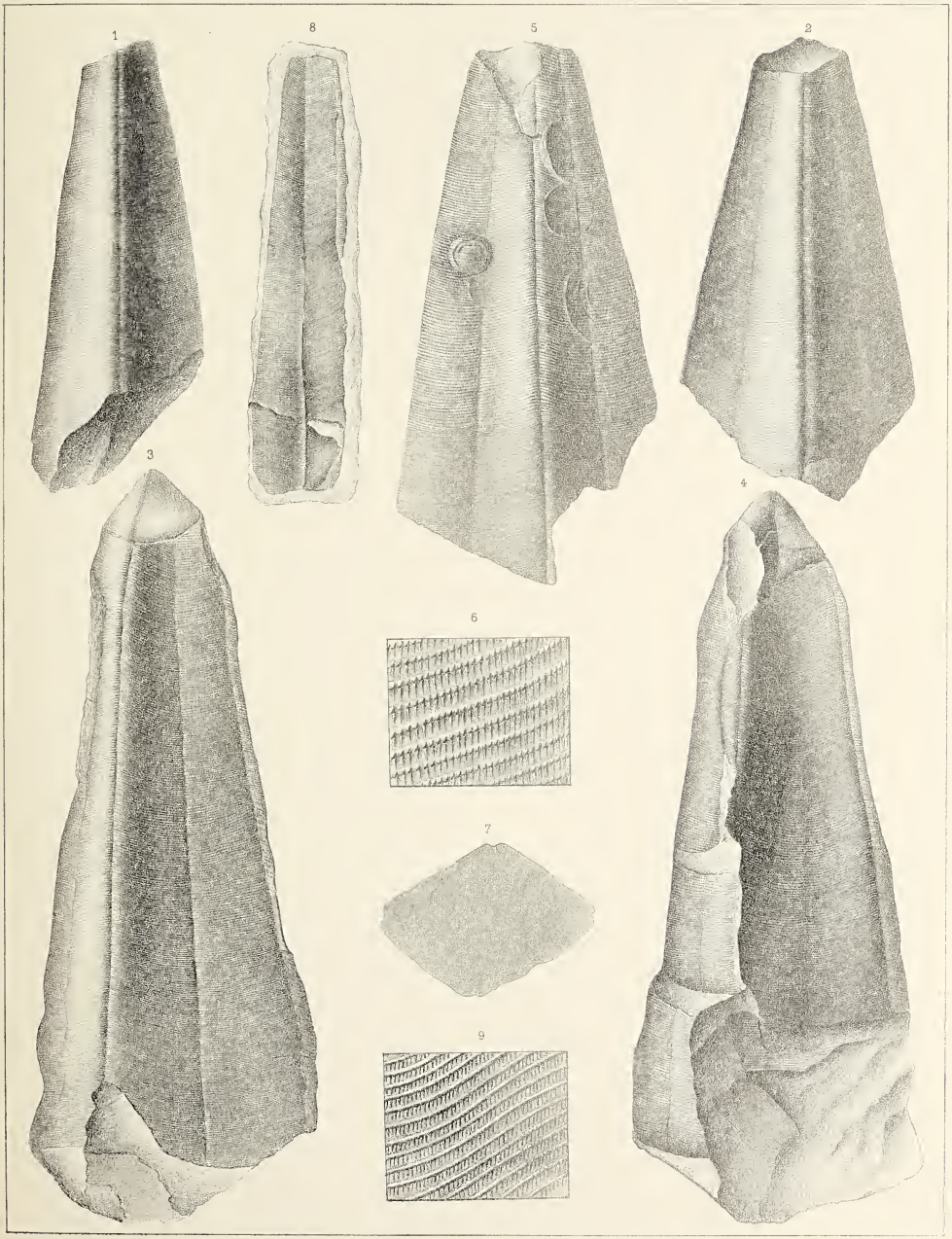
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PLATE XXXIV.

Conularia congregata.

Page 214.

Fig. 1. A fragment of a large slab which contains parts of eleven different individuals. Many of these have a species of Discina attached, as seen also on *Conularia continens*, and in *C. undulata*.

Conularia Cayuga.

Page 211.

Fig. 2. An imperfect specimen, as obtained from a gutta-percha impression in the natural mold, showing parts of two of the faces of the pyramid.

Fig. 5. Enlargement of the surface as seen on three different parts of the specimen. The two upper lines of the figure show characters seen on the upper half of the shell; the lower part exhibits the features as seen on the larger part near the angle where the lines become crowded. The transverse ridges, where perfect, are studded with elevated nodes.

Conularia continens.

Page 212.

Fig. 4. A small specimen showing two of the faces.

Fig. 3. Enlargement of the surface of the same, showing the markings.

Fig. 6. A fragment of a larger specimen, with very crowded striæ near the aperture. This specimen shows three individuals of *Discina humilis* which have been attached to the surface.

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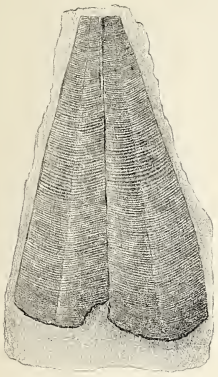

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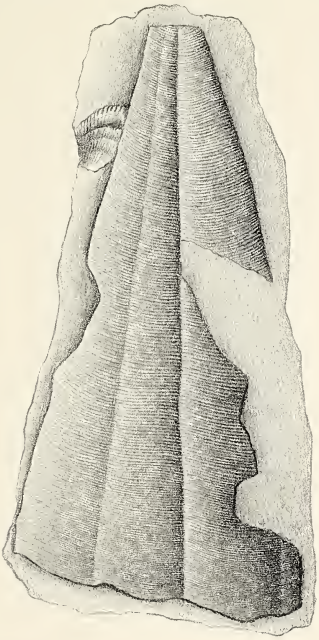

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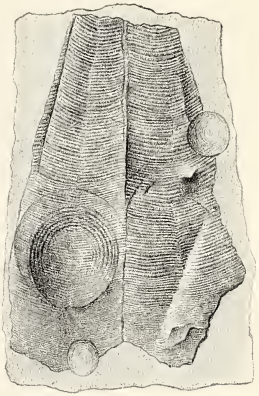

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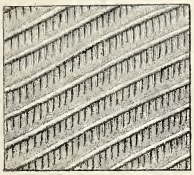

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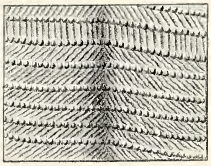

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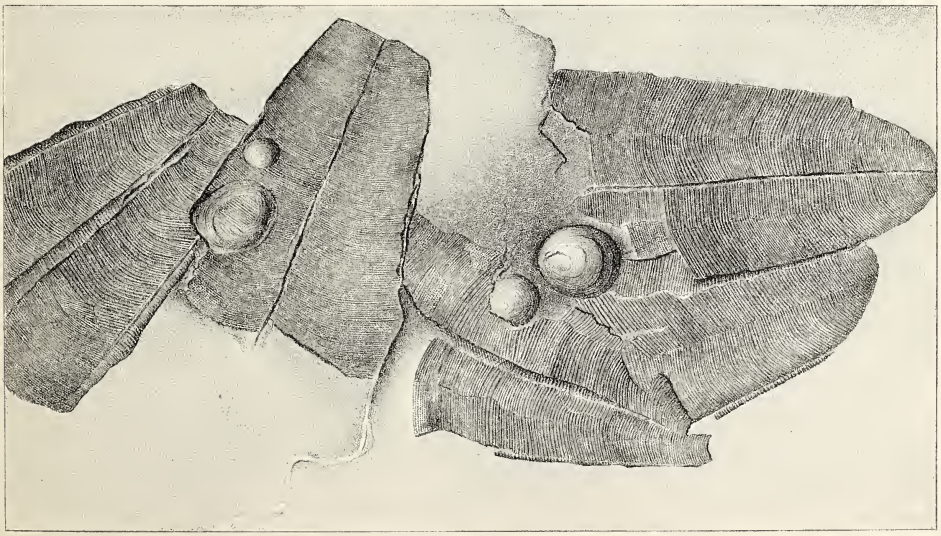

PLATE XXXIV A.

Conularia undulata.

Page 208.

See Plate 33.

Fig. 1. An enlargement to six diameters from a gutta-percha impression of a mould of the specimen represented in fig. 5, plate 33

Fig. 2. A small specimen with extremely fine transverse striæ, and resembling very closely *Conularia crebristriata.*

Fig. 3. A transverse section of fig. 2, showing the quadrangular form, with concave sides and indented angles. The specimen is slightly distorted by pressure.

Fig. 4. An enlargement to six diameters of the surface of the specimen fig. 2, showing the character of the shell surface on the right hand of the figure, and of the cast of the interior on the left, with the somewhat oblique longitudinal striæ.

Conularia crebristriata.

Page 210.

See Plate 33.

Fig. 5. An enlargement of the surface of this species to six diameters from the specimen fig. 8, pl. 33, showing the nodes upon the transverse ridges, and the longitudinal striæ. A comparison with the other figures, having the same degree of enlargement, will show the distinctive features of the species.

Conularia continens.

Page 212.

See Plates 33, 34.

Fig. 6. An enlargement to six diameters, showing the interlocking of the transverse ridges. The nodes are preserved in some parts, and the longitudinal striæ are shown over the entire surface, as they usually appear.

Conularia continens, var. rudis.

Page 215.

Fig. 7. A specimen, natural size, showing the short, abrupt cone, and the strong surface-markings.

Fig. 8. An enlargement of a portion of the surface of fig. 7, showing the transverse ridges, with the nodes preserved on some parts; while the intermediate, longitudinal striæ are strongly marked.

Conularia congregata.

Page 214.

See Plate 34.

Fig. 9. An enlargement from the specimen illustrated in fig. 1, pl. 34, showing the strong and somewhat irregular, nodose, transverse ridges, and the intermediate, longitudinal striæ, which are usually obscure or obsolete.

Fig. 10. An enlargement from another portion of the surface of the same specimen, on which the transverse ridges are almost free from nodes, and the longitudinal striæ are obscurely visible; probably due to maceration or exfoliation.

Fig. 11. An enlargement from another specimen of the same species, showing the transverse ridges almost entirely free from, or obscurely marked by, nodes, while the intermediate, longitudinal striæ are continuous and well preserved.

Conularia Newberryi.

Fig. 12. An enlargement to two diameters of the transverse ridges, showing their delicately annular character, and the manner of their junction along the centre of the lateral face. The figure is given for comparison with a similar portion of the surface of *C. continens*, fig. 6.

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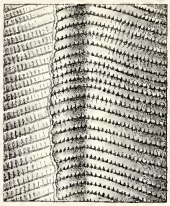

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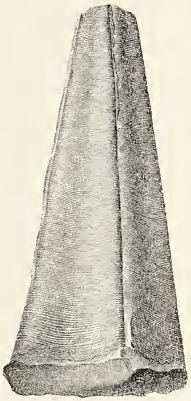

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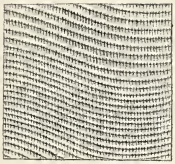

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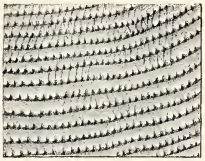

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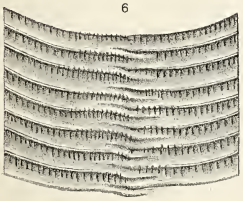

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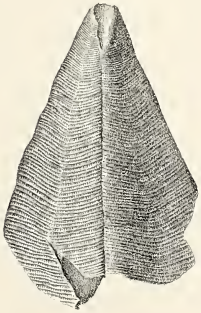

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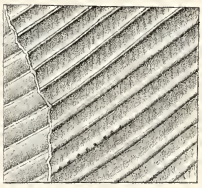

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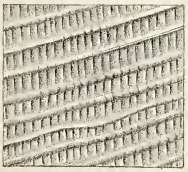

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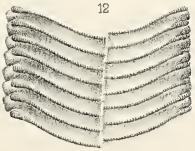

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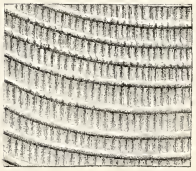


PLATES AND EXPLANATIONS

OF

CEPHALOPODA.

PLATE XXXV.

Orthoceras Pelops.

Page 233.

See Plates 35 A, 37, 78 B.

Fig. 1. A fragment, preserving a considerable portion of the chamber of habitation, showing a gentle constriction below the aperture. The great convexity of the septum at the lower extremity of the figure is due to the flattening of the specimen. *Schoharie, N. Y.*

Figs. 2, 2 a. A septate fragment, retaining its form and septa, without compression; 2, a section showing size and position of siphuncle. *Helderberg mountains.*

Fig. 3. Enlargement of a portion of the test from specimen fig. 2.

Orthoceras luxum.

Page 244.

See Plates 76, 77, 78, 78 B, 81, 112.

Fig. 4. A crushed fragment, showing a usual exsolute condition of the air-chambers. *Schoharie, N. Y.*

Fig. 5. A fragment of the septate portion of an individual, presenting the characters of the organic deposit on each side of the carina, and on the ventral walls of the chambers.

Fig. 6. Same as the preceding, showing this feature in a less marked degree.

Fig. 7. A small fragment, retaining, in the cast, evidences of the lamellose-striate surface of the test.

Orthoceras Tantalus.

Page 241.

See Plate 35 A.

Fig. 8. A specimen retaining a portion of the chamber of habitation and fifteen air-chambers. The banded or zoned appearance, so prominent in *O. cingulum*, is here much less marked.

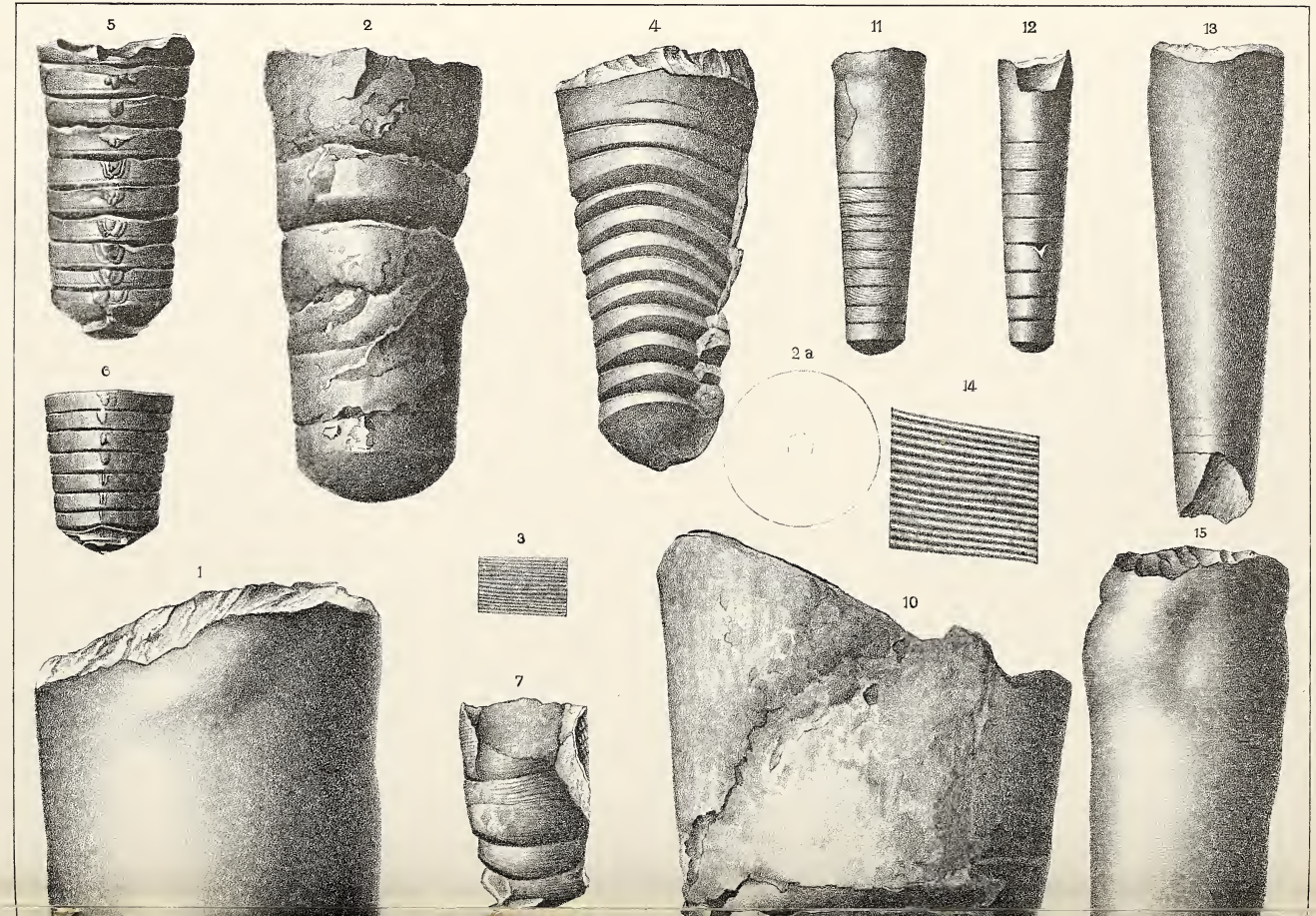
Fig. 9. A septum of the preceding specimen, showing the size and position of the siphuncle, and the organic deposit on the septum around the siphuncle.

Fig. 10. Portion of a large individual, presenting the same features as specimen figs. 8, 9.

Orthoceras carnosum.

Page 258.

Fig. 11. Ventral view of a specimen retaining the grand chamber and ten of the air-chambers, showing the surface characters and the sinus of the ornaments. *Schoharie, N. Y.*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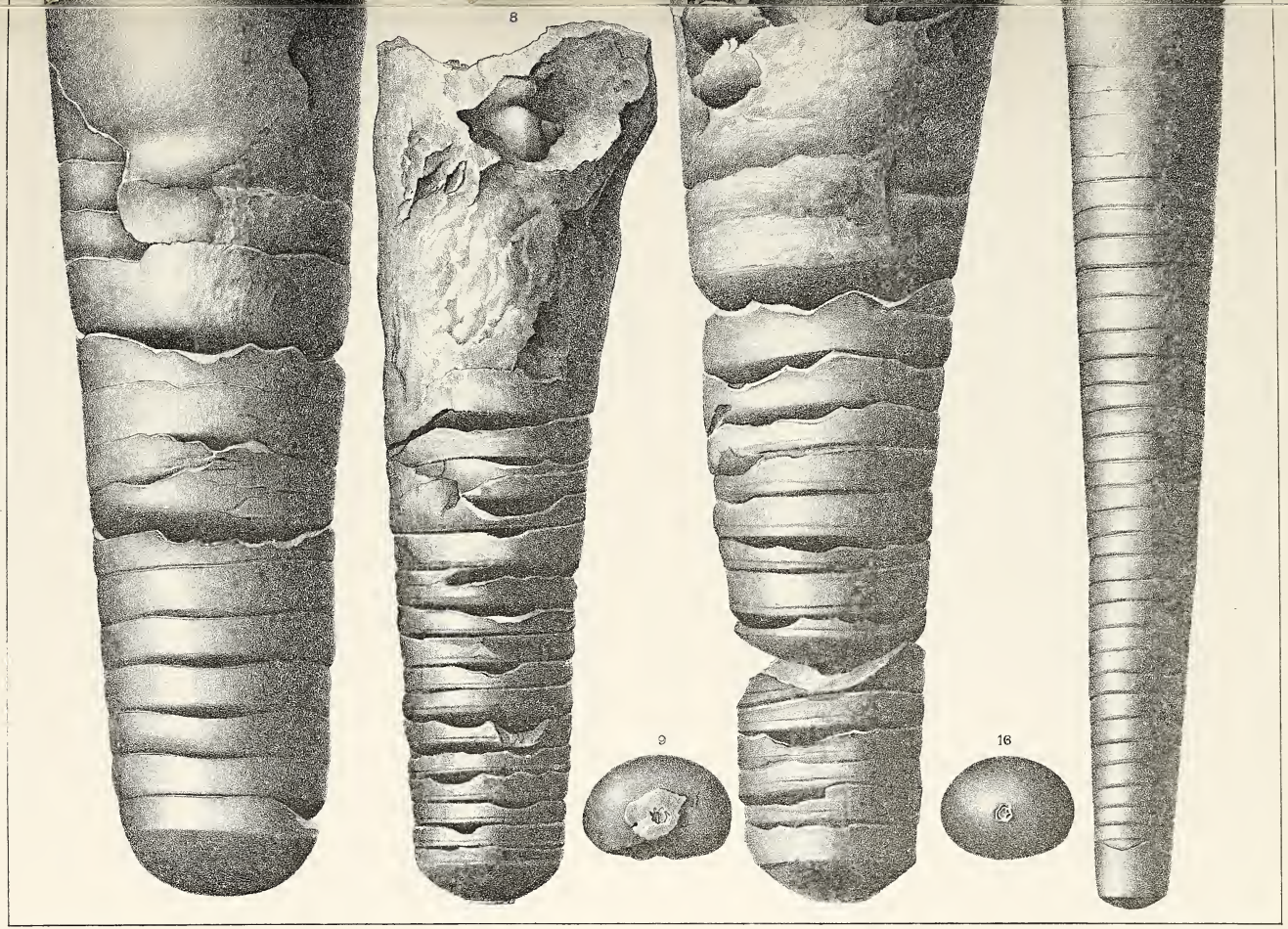

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Schoharie Grit etc.

(ORTHOCERATIDÆ.)

Palæontology of N Y Vol V Pt II

Plate [illegible]

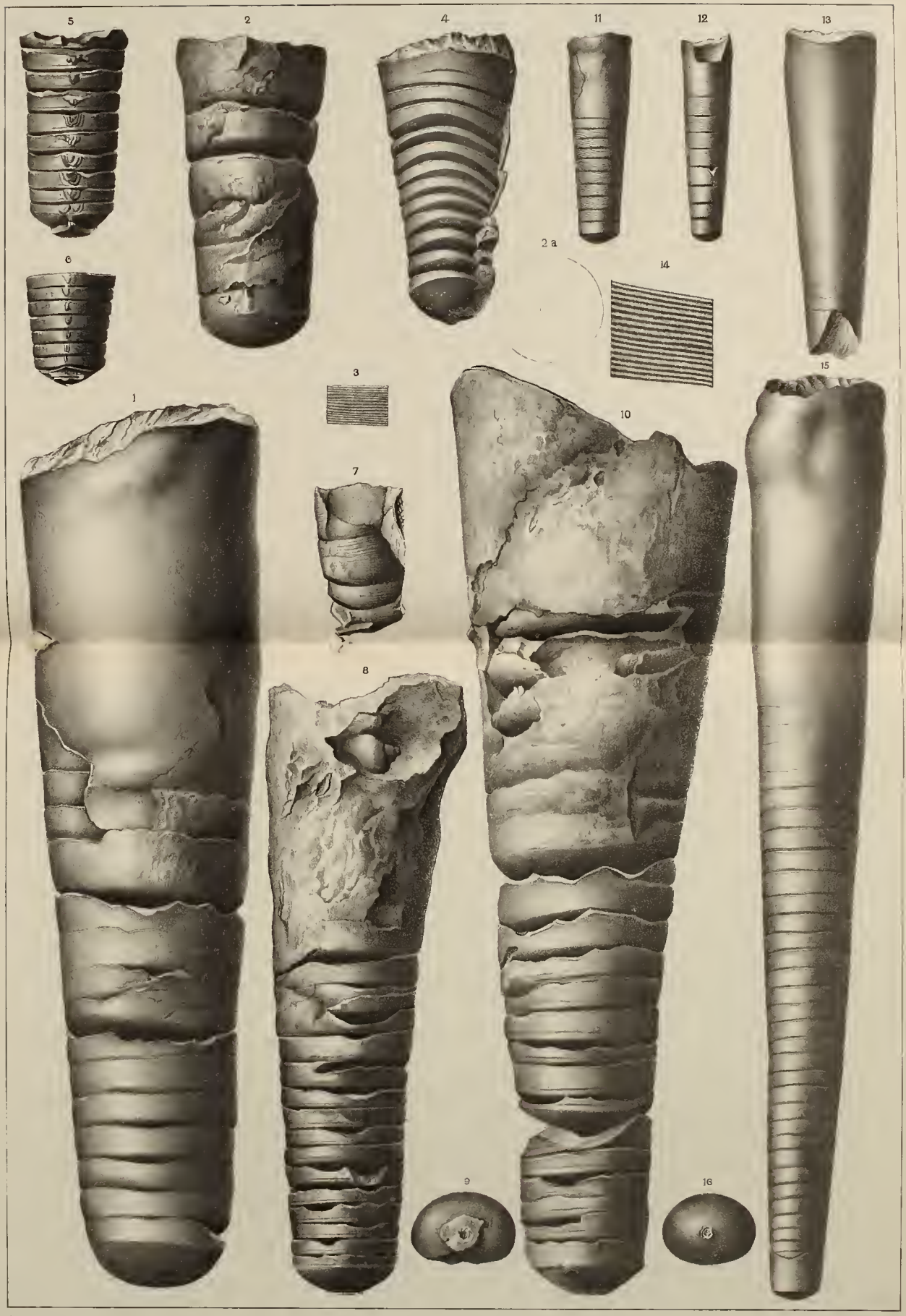

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PLATE XXXV.—*Continued.*

Orthoceras jaculum.

Page 266.

Fig. 12. A fragment, preserving eight air-chambers and a portion of the chamber of habitation. Surface-markings are shown over a portion of the tube. Upper Helderberg limestone at *Clarence Hollow, N. Y.*

Orthoceras molestum.

Page 265.

Fig. 13. The chamber of habitation nearly entire, and a portion of five of the posterior air-chambers, showing the regular and rapid expansion of the tube to the aperture, Upper Helderberg limestone. *Clarence Hollow, N. Y.*

Orthoceras pravum.

Page 255.

See Plates 36, 81, 112.

Fig. 14. An enlargement to six diameters of the surface of a portion of the test remaining on specimen fig. 1, pl. 36, showing the character of the transverse striæ.

Orthoceras procerus.

Page 249.

See Plates 78 A, 79.

Fig. 15. An imperfect individual, preserving the outer chamber nearly entire, with about thirty-six septa. Schoharie grit, *Schoharie, N. Y.*

Fig. 16. Septum of specimen fig. 1, pl. 78 A, showing the position and size of the siphuncle at the septum. *Schoharie, N. Y.*

PLATE XXXV A.

Orthoceras Pelops.

Page 233.

See Plates 35, 37, 78 B.

Fig. 1. A large, imperfect individual, retaining its normal form and convexity. Several additional chambers, belonging to the specimen, at the smaller extremity, are not represented in the figure. *Clarksville, N. Y.*

Fig. 2. Longitudinal section showing the depth of the chambers, taken from the middle of specimen fig. 1.

Fig. 3. A septum of specimen fig. 1, showing the position of the siphuncle.

Fig. 4. Longitudinal section showing traces of the siphuncle in its passage through the chambers.

Fig. 5. A very large, flattened chamber of habitation belonging to this species, showing a constriction near the aperture. *Knox, N. Y.*

Fig. 6. Longitudinal section showing the depth of the chambers somewhat shallower than usual, the concavity of the septa, and remains of the siphuncle.

Orthoceras Tantalus.

Page 241.

See Plate 35.

Fig. 7. Longitudinal section showing the depth of the chambers and the convexity of the septa. Traces of an expanded siphuncle shown in the specimen are not represented

Fig. 10. A septum showing the size and position of the siphuncle, surrounded by an areola, and an organic deposit on the septum.

Orthoceras Ohioense.

Page 236.

See Plate 36.

Fig. 8. Longitudinal section from specimen (plate 36, fig. 4). The septa are mostly broken away. Evidences of a slightly expanded siphuncle are shown in the first two chambers, but not represented in the figure. *Delaware, Ohio.*

Fig. 9. A septum of preceding specimen, showing size and position of the siphuncle.

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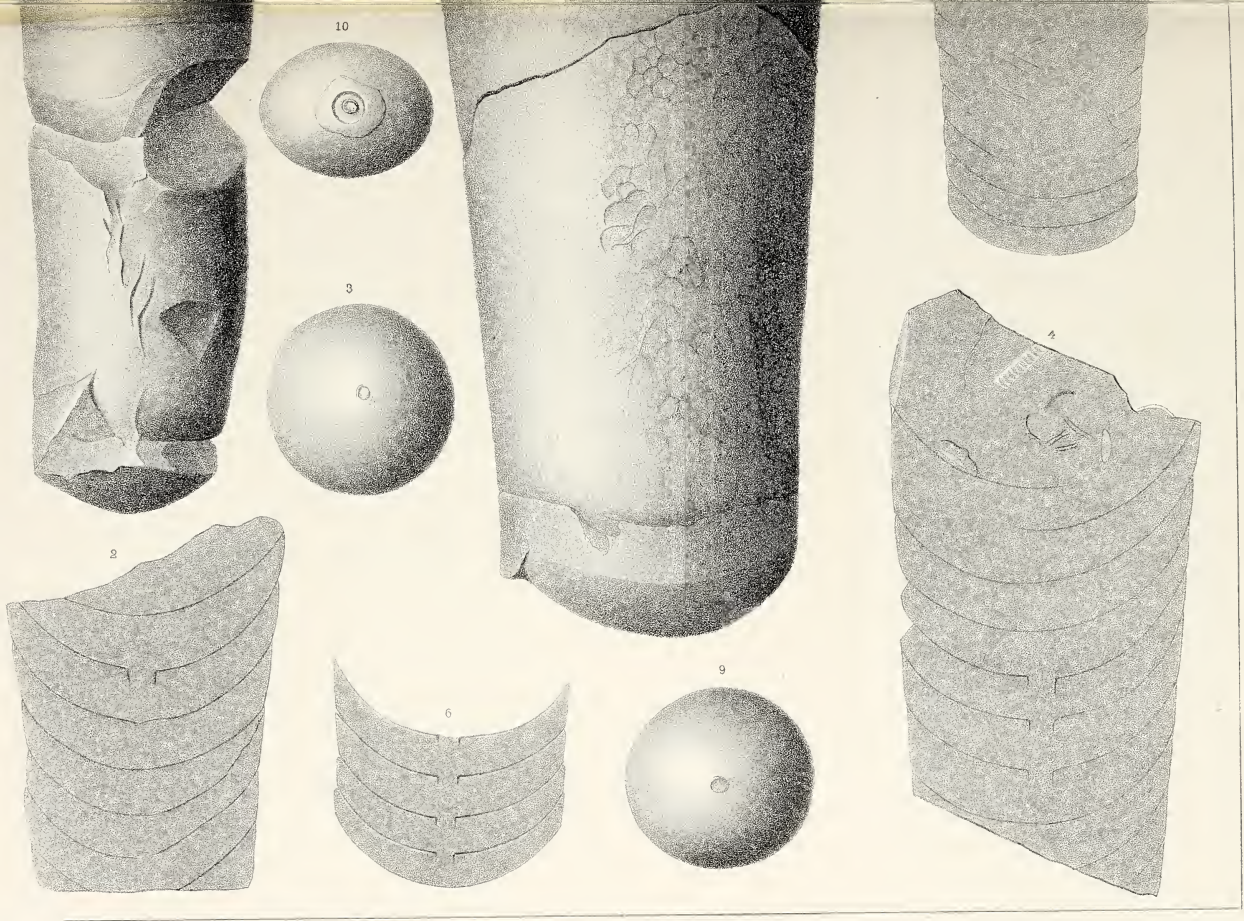

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UPPER HELDERBERG GROUP.

Schoharie Grit.

(ORTHOCERATIDÆ.)

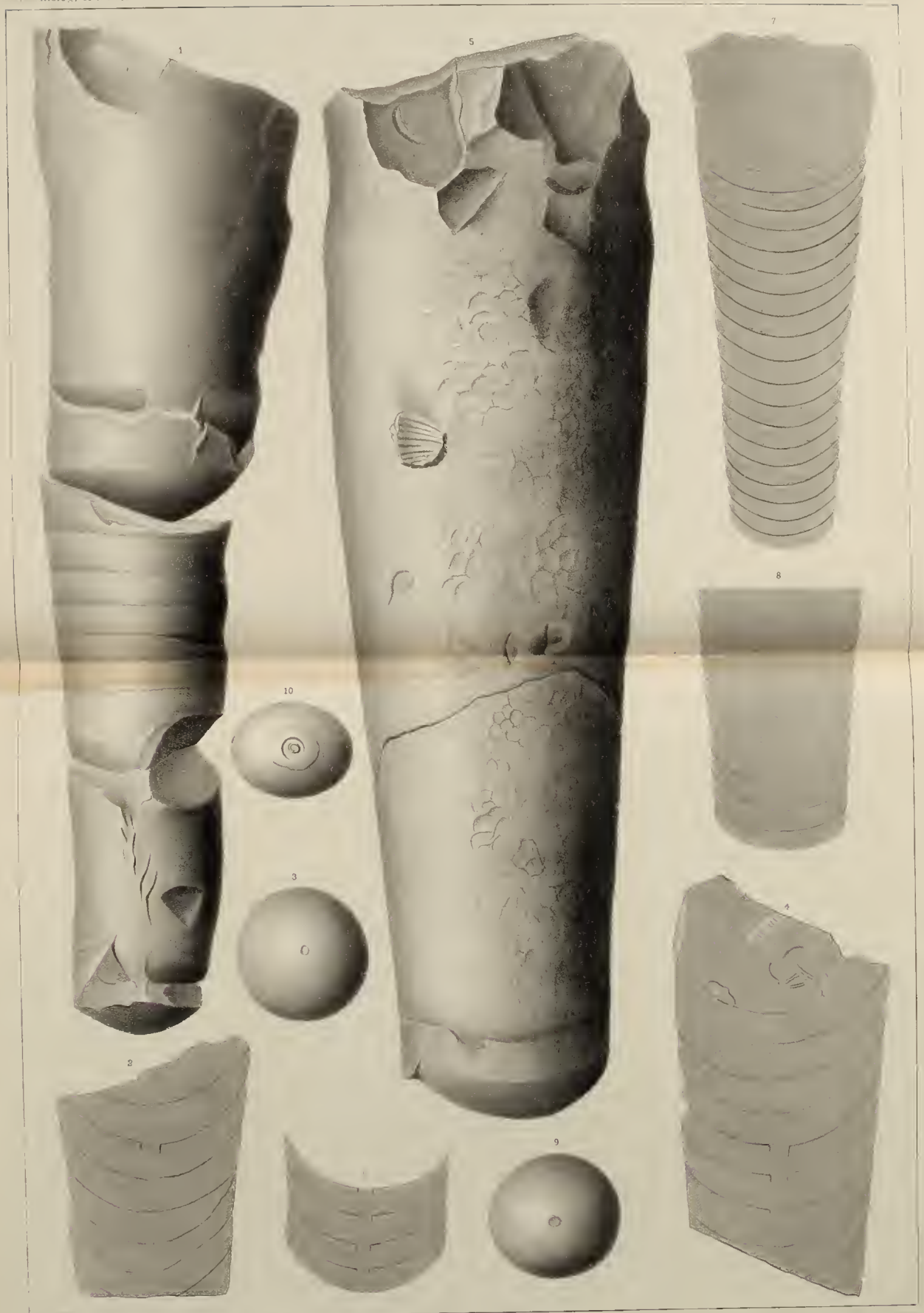

PLATE XXXVI.

ORTHOCERAS PRAVUM.

Page 255.

See Plates 35, 81, 112.

Fig. 1. A septate fragment, preserving nearly its normal form. The transverse striæ and areolar markings and striations on the septa are not represented.

ORTHOCERAS STYLUS.

Page 253.

See Plate 79.

Fig. 2. A small individual, preserving thirteen chambers and a portion of the grand chamber. A longitudinal section of this specimen is shown in fig. 1, pl. 79.

Fig. 3. A larger individual, showing the great length and cylindrical form of the chamber of habitation.

ORTHOCERAS OHIOENSE.

Page 236.

See Plate 35 A.

Fig. 4. Lateral view of an individual, retaining the chamber of habitation and twenty adjacent chambers, showing the slight curvature of the tube, which is apparently a normal feature. Upper Helderberg, *Delaware, O.*

CYRTOCERAS EUGENIUM.

Page 369.

See Plates 47, 96, 97.

Fig. 5. The inner side of a portion of the shell imbedded in limestone, showing little or no curvature, with the lamellæ extending on either side. A remarkably large individual of the species. This specimen is the original of *Orthoceras foliatum.* Schoharie grit, *Schoharie, N Y.*

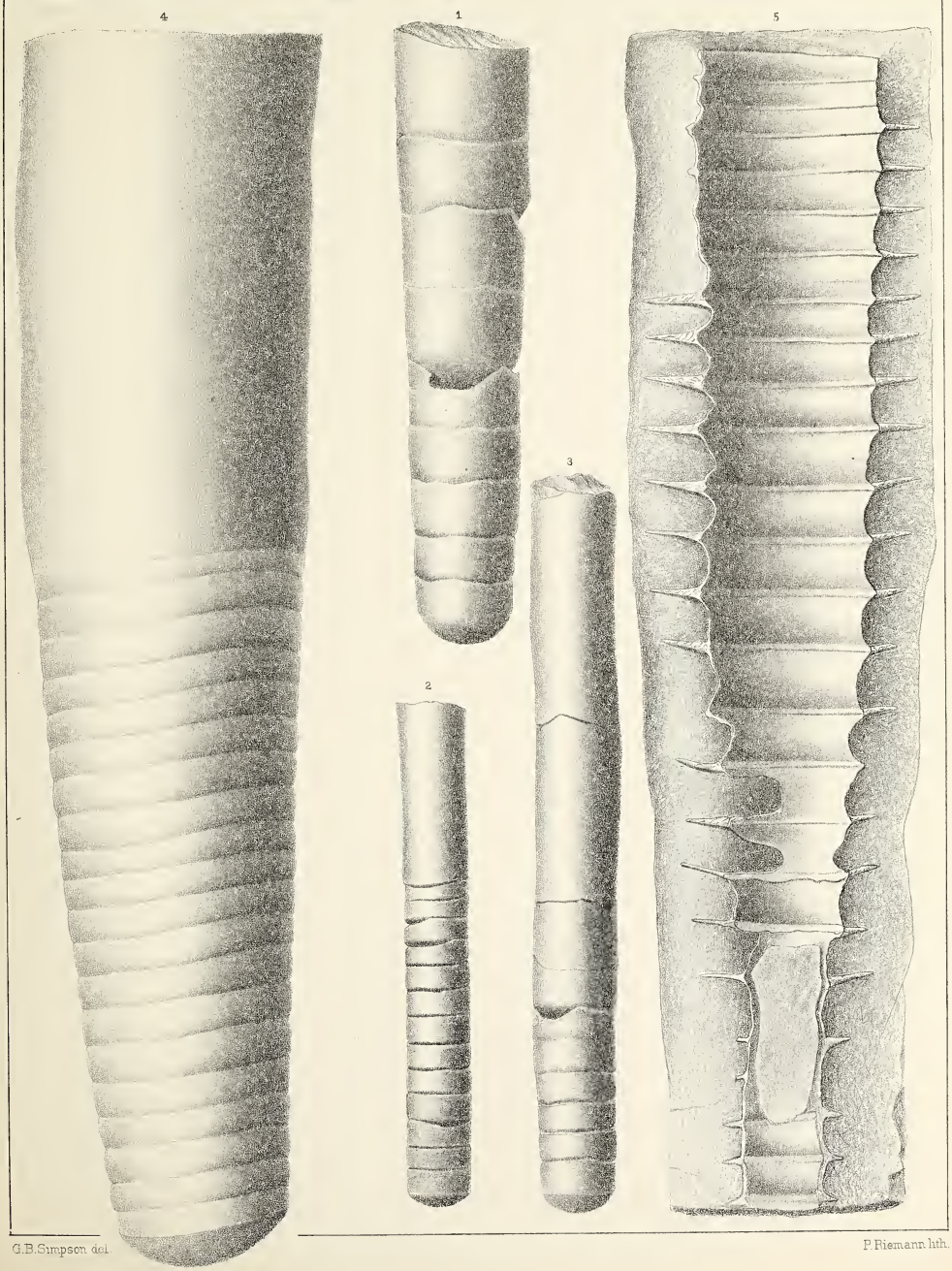
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PLATE XXXVII.

Orthoceras inoptatum.

Page 267.

See Plate 112.

Fig. 1. A fragment, retaining a large part of the chamber of habitation, and showing the regular frequency of the septa. From the Upper Helderberg limestone. *Western New York.*

Orthoceras rudicula.

Page 268.

See Plate 112.

Fig. 2. A septate fragment, showing the rapid expansion of the tube, and the increase in the depth of the air-chambers from the apex toward the chamber of habitation. *Stafford, N. Y.*

Orthoceras Pelops.

Page 233.

See Plates 35, 35 A, 78 B.

Fig. 3. A septum, preserving the natural circular form of the transverse section.

Fig. 4. A septum, showing an elliptical form, due to compression. Schoharie grit. *Schoharie* and the *Helderberg mountains.*

Orthoceras viator.

Page 270.

Fig. 5. A fragment, preserving the chamber of habitation nearly entire, and portion of two of the air-chambers, partially showing the double constriction of the tube toward the aperture. Upper Helderberg limestone. *Clarence Hollow, N. Y.*

Orthoceras Œdipus.

Page 294.

See Plate 82.

Fig. 6. A fragment, probably of the outer chamber, showing the surface ornaments Hamilton group. *Geneseo, N. Y.*

Orthoceras profundum.

Page 271.

Fig. 7. A cast of the chamber of habitation, preserving its normal form and retaining the imprint of the surface-markings from the interior of the test. *Williamsville, N. Y.*

Fig. 8. A fragment of the test of the grand chamber, showing the surface ornamentation. *Black Rock, N. Y.*

Fig. 9. A partial cast of the chamber of habitation, preserving a portion of the shell. *Williamsville, N. Y.*

The specimens of this species are all from the limestone of the Upper Helderberg.

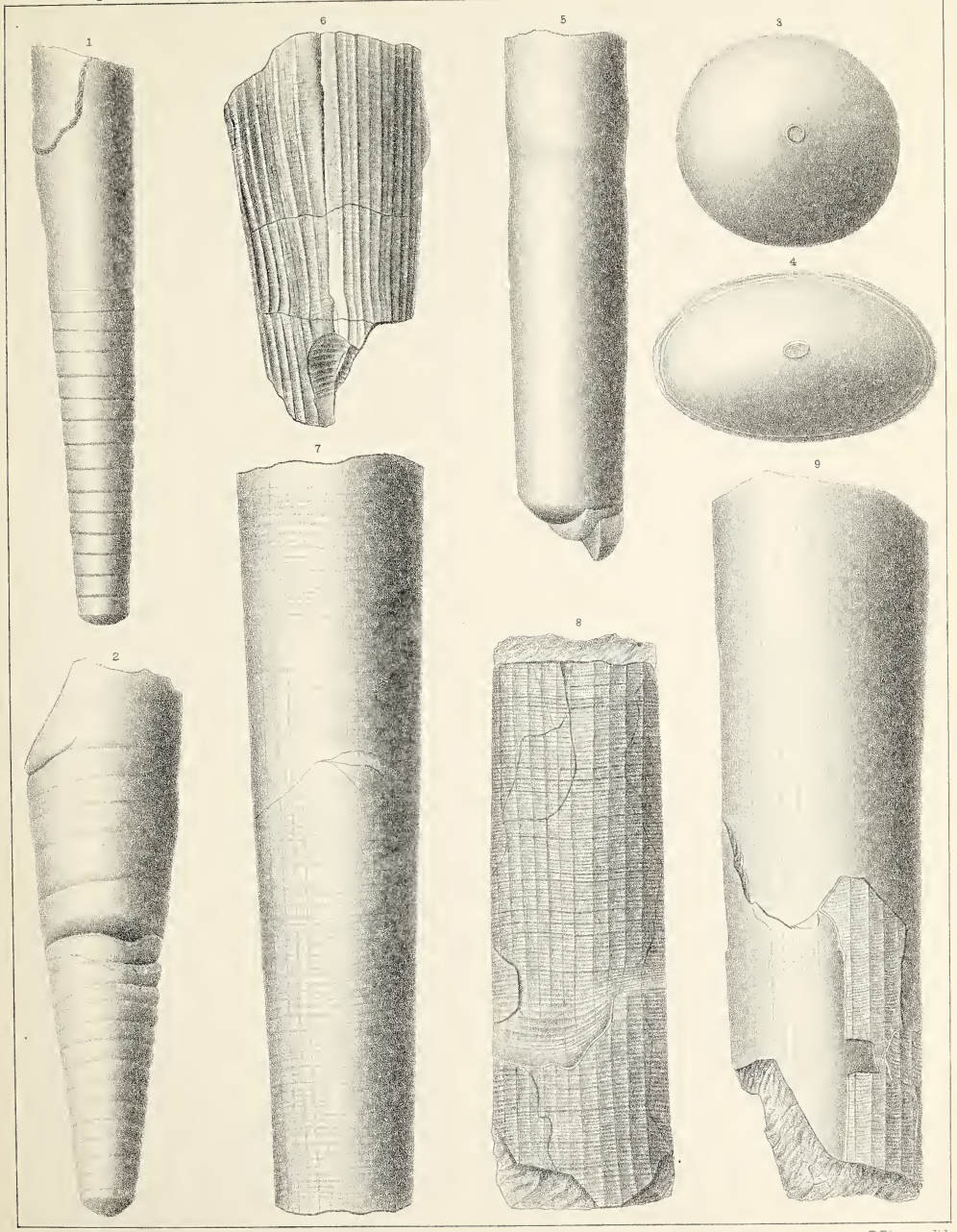
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PLATE XXXVIII.

Orthoceras Sicinus.

Page 301.

Fig. 1. A fragment showing the form and proportions of the shell, with the obscure annulations and surface-markings. The annulations are not represented sufficiently distinct. Marcellus shale. *Avon, N. Y.*

Fig. 2. An enlargement of the surface of the preceding specimen, showing the rounded annulations and reticulate surface.

Orthoceras subulatum.

Page 283.

See Plates 84, 86.

Fig. 3. The original of the species, which is nearly entire, preserving the chamber of habitation. The specimen is flattened from pressure in the shale. Marcellus shale. *Bloomfield, N. Y.*

Orthoceras Marcellense.

Page 278.

See Plate 83, 113.

Fig. 4. A fragment preserving several of the air-chambers, and a portion of the test with the external markings.

Fig. 5. The ventral side of a larger fragment retaining portions of the test over the surface, and the carina on the internal mould, which is too prominently represented along the chamber of habitation towards the aperture.

Fig. 6. A nearly entire individual showing the length of the outer chamber and the increase in the frequency of the septa toward the apex. The peculiar organic deposit and ornamentation of the internal cast, shown in the specimen, are not represented in the figure. The apex is represented as entire, but several air-chambers are wanting in the specimen.

Fig. 7. A larger example, imperfect at both extremities, retaining fragments of the test on different parts of the surface.

Fig. 9. An enlargement of the surface, showing the transverse striæ interrupted by longitudinal lines.

The above specimens are all from the Goniatite limestone of the Marcellus shale. *Manlius, Marcellus,* and other places in New York.

Orthoceras aptum.

Page 282.

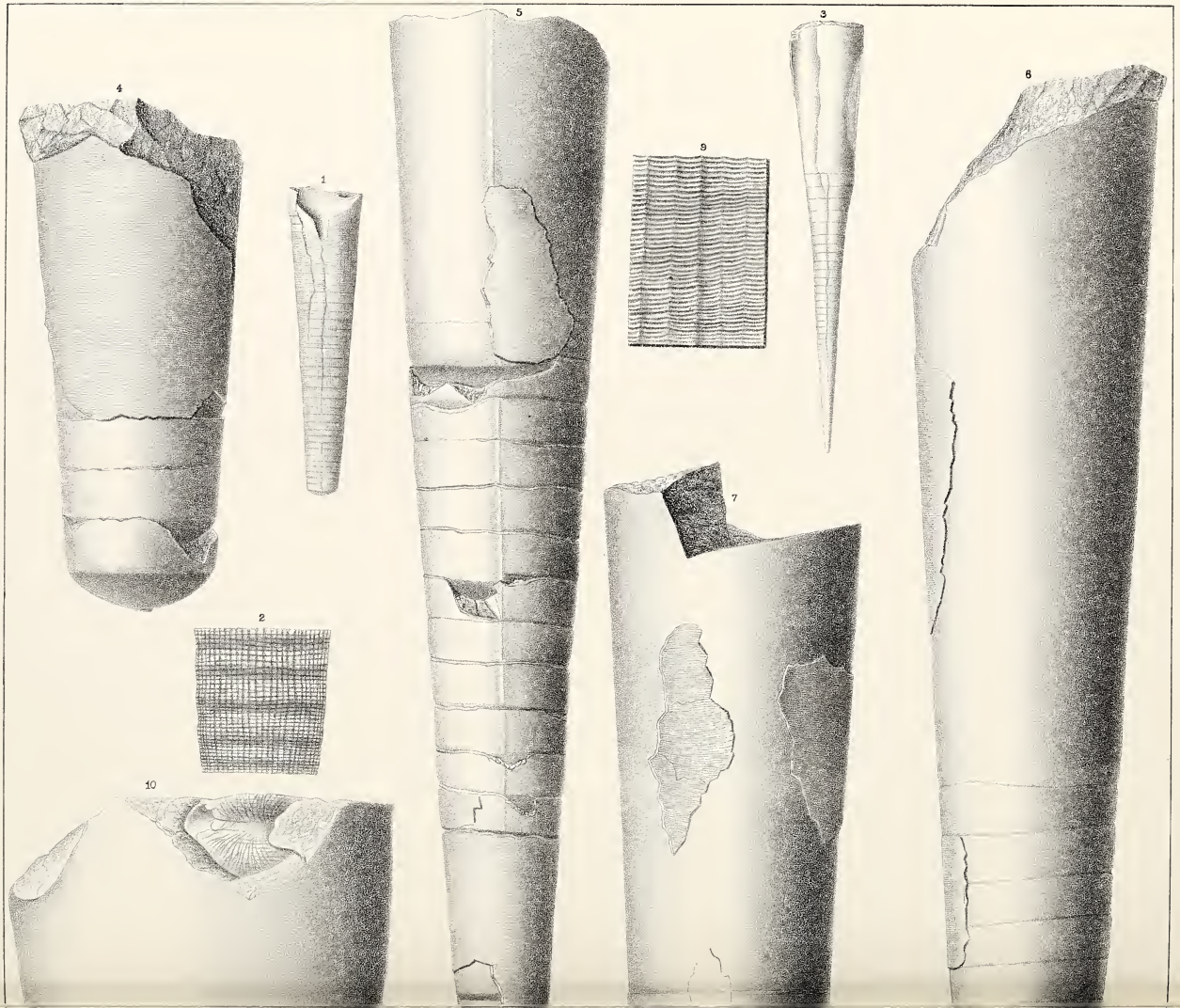
Fig. 8. An individual preserving the greater portion of the chamber of habitation, and over thirty air-chambers, showing the gradually enlarging tube, and the curved and oblique septal sutures: dorsal view. Goniatite limestone. *Manlius, N. Y.*

Orthoceras Bebryx.

Page 275.

See Plates 39, 83, 84.

Fig. 10. A large fragment of the septate portion, retaining a part of the chamber of habitation. Hamilton shales. *Cazenovia, N. Y.*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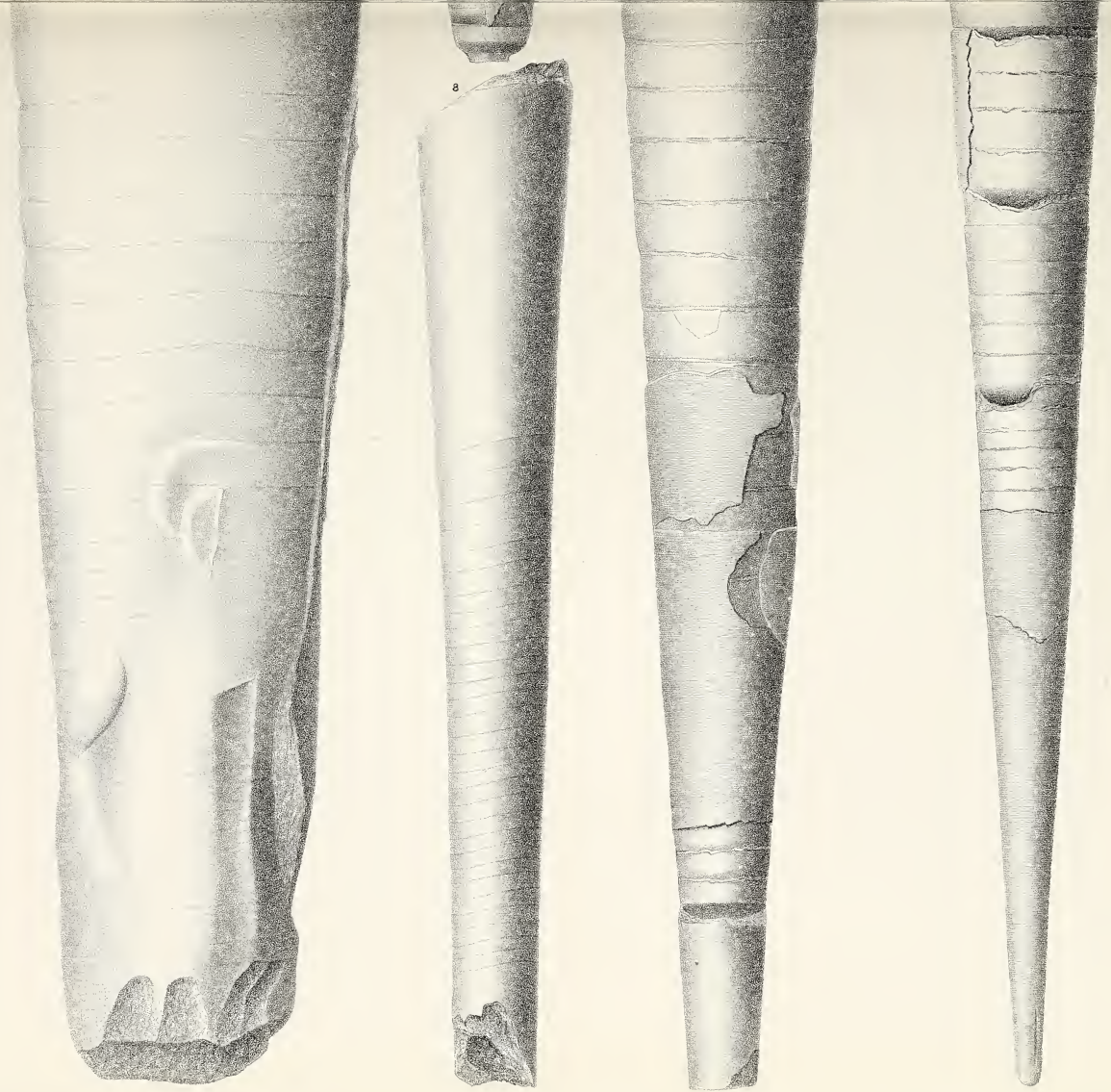

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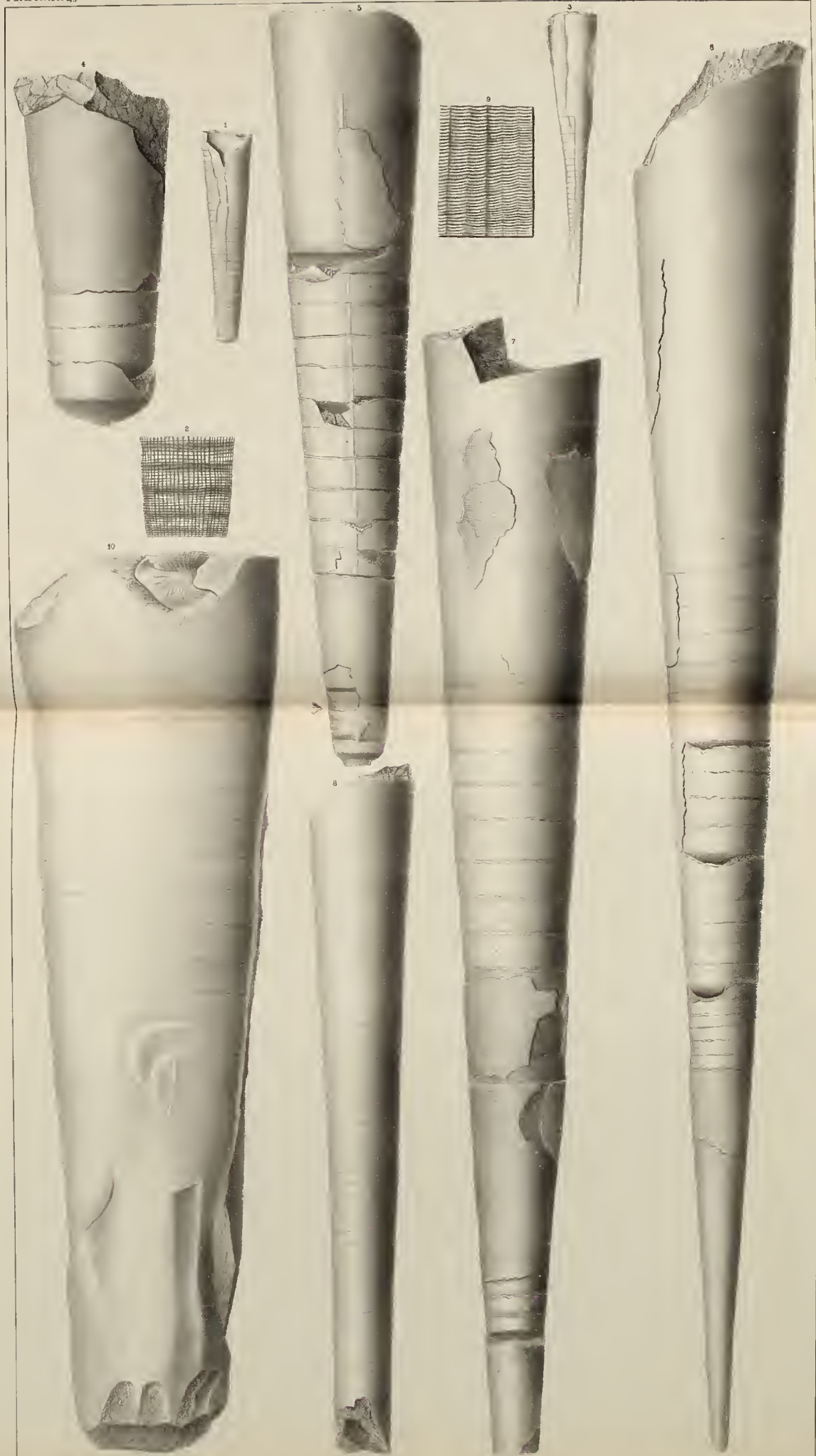
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PLATE XXXIX.

ORTHOCERAS BEBRYX, var. CAYUGA.

Page 276.

See Plates 86, 91, 92.

Fig. 1. An internal cast, showing a portion of the chamber of habitation and fifteen of the adjacent air-chambers. Lower beds of the Chemung. *Cortland, Cortland county, N. Y.*

ORTHOCERAS BEBRYX.

Page 275.

See Plates 38, 83, 84.

Fig. 2. A fragment, obliquely compressed, producing an arching of the septal sutures. Hamilton group. *Madison county, N. Y.*

ORTHOCERAS EXILE.

Page 290.

See Plates 84, 85.

Fig. 3. An individual nearly entire, showing the gentle constriction of the tube near the aperture, and the slender form of the shell. This is the original specimen of the species, and is from the coarse shales of the Hamilton group at *Cazenovia, Madison county, N. Y.*

ORTHOCERAS EMACERATUM.

Page 292.

See Plate 85.

Fig. 4. The original of the species, showing the depth of the chambers and the gradual enlargement of the tube. Hamilton group, *South Shore of Lake Erie.*

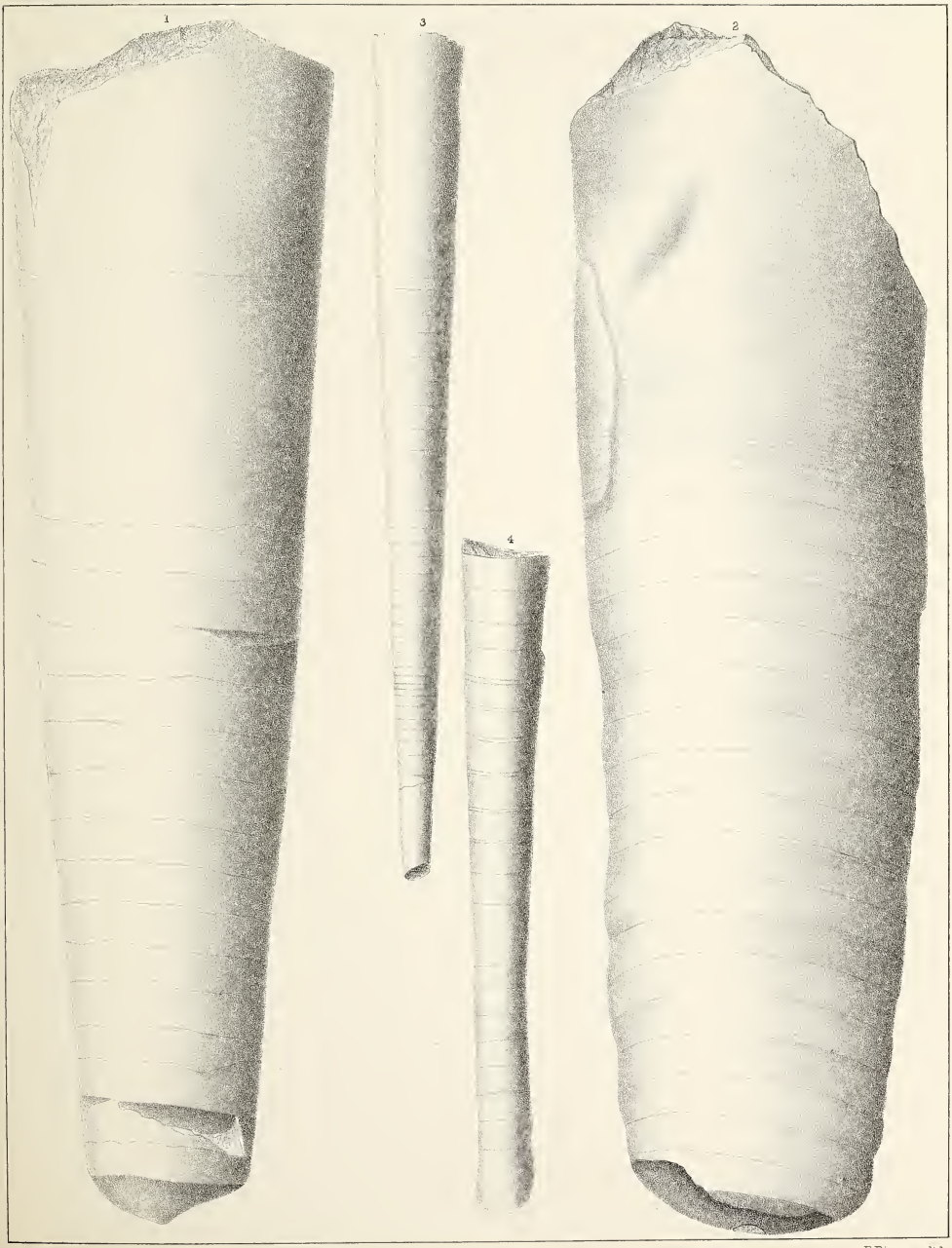
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PLATE XL.

Orthoceras Eriense.

Page 274.

See Plate 87.

Fig. 1. The chamber of habitation apparently entire, with a portion of two of the adjacent air-chambers. *Lake Erie shore, Hamburg, N. Y.*

Fig. 2. The convex surface of a septum, from the preceding specimen, showing the central position of the siphuncle.

Fig. 3. A portion of the test, enlarged two diameters.

Fig. 4. A fragment of the septate portion of an individual referred to this species. The specimen is extremely compressed, and preserves no surface-markings as evidence of the position of the siphuncle. A parasitic, branching Bryozoan extends over a portion of the exterior of the air-chambers. *Otisco, Onondaga county, N. Y.*

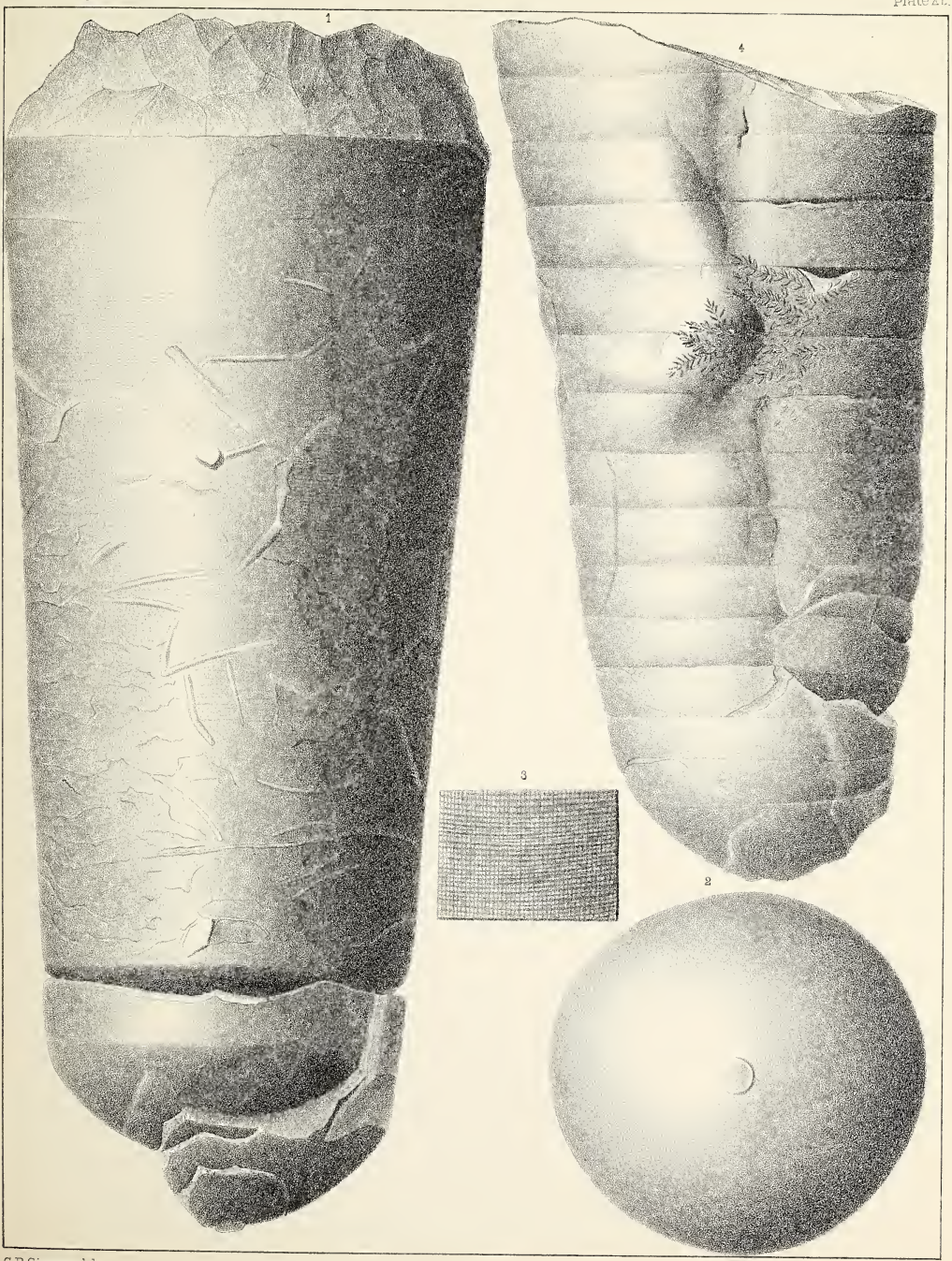
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PLATE XLI.

Orthoceras Thoas.

Page 261.

See Plates 78 B, 79, 80, 112.

Fig. 1. A compressed fragment of the outer chamber, which is more closely annulated than usual, showing longitudinal striæ in some parts.

Fig. 2. A similar specimen, showing striæ upon some parts of the surface. This and the preceding are from the limestone of the Upper Helderberg at *Schoharie, N. Y.*

Figs. 3, 4. Specimens preserving the outer chambers, which are scarcely compressed, with the annulations more distant than in the preceding specimens. The surface preserves the longitudinal striæ. These specimens are from the Schoharie grit, and are the originals used in the description of *O. Thoas. Schoharie, N. Y.*

Fig. 5. The non-septate portion of a small individual, preserving the cylindrical form and the more frequent annulations, except at the upper end. From the Schoharie grit. *Schoharie, N. Y.*

Fig. 6. A large non-septate portion of a specimen retaining the natural form, and showing closely arranged annulations in the lower part, which gradually increase in distance toward the aperture, where they are much more distant. Schoharie grit. *Schoharie, N. Y.*

Fig. 7. A septate fragment with the annulations closely arranged, and more angular than usual. This specimen is the original of *O. Hyas.* Schoharie grit. *Schoharie, N. Y.*

Fig. 8. A small uncompressed, septate portion of an individual, showing the regularity of the septa and annulations. From the Upper Helderberg limestone at *Clarence Hollow, Erie county, N. Y.*

Fig. 9. A fragment of a large individual referred with doubt to this species. The specimen is much compressed, and preserves no remains of the surface ornaments. The obliquity of the annulations is apparently due to the flattening of the shell. From the Corniferous limestone of *Ohio.*

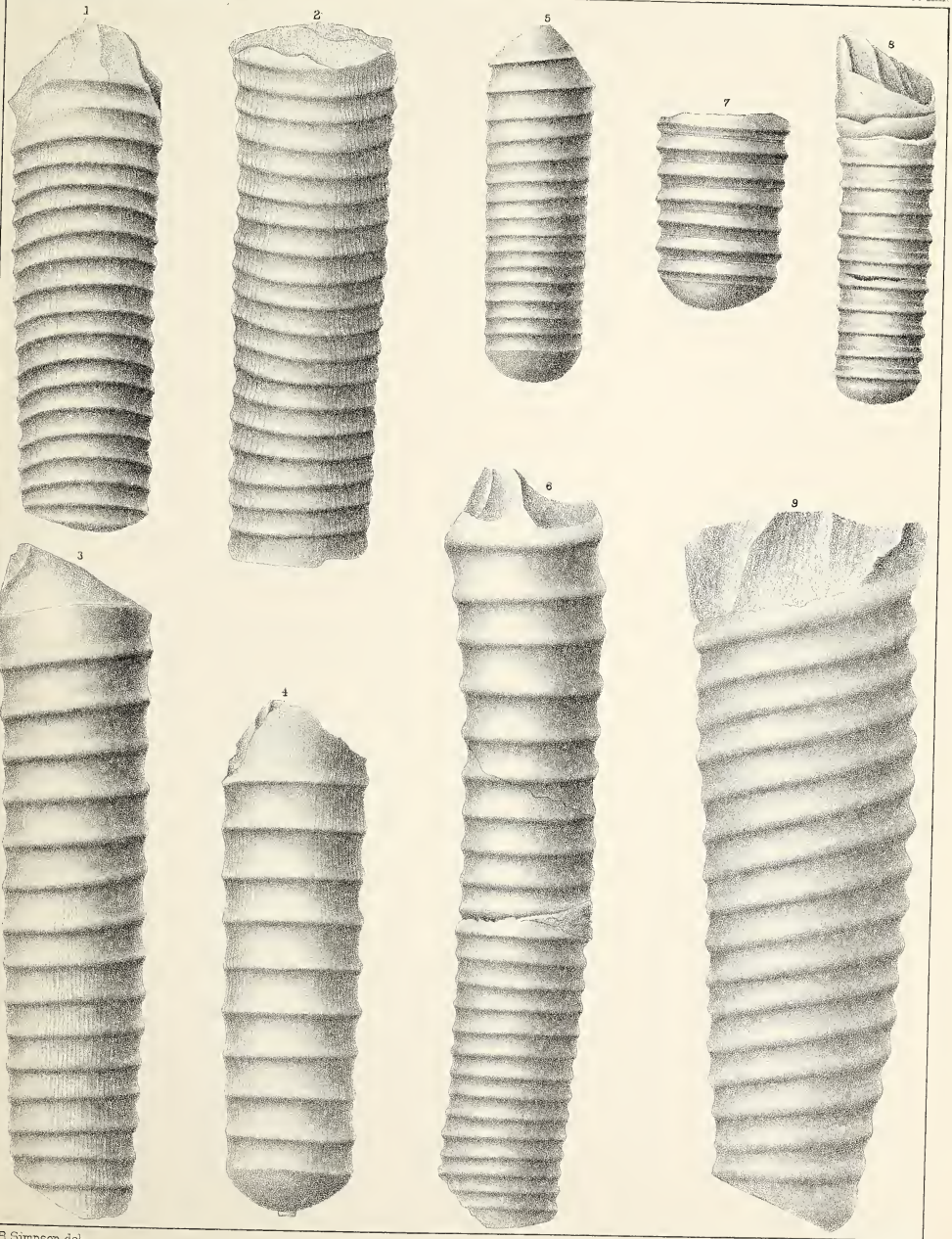
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PLATE XLII.

Orthoceras crotalum.

Page 296.

See Plates 82, 113.

Fig. 1. A portion of the chamber of habitation, showing the absence of annulations near the aperture, and the strong, lamellose, striate surface of the internal mould. *Schoharie county, N. Y.*

Fig. 2. A specimen similar to the preceding, with the annulations more prominent, and slightly oblique. *Pratt's Falls, N. Y.*

Fig. 3. A fragment somewhat compressed, showing the marked annulations, and the depth of the air-chambers. *Cazenovia, N. Y.*

Fig. 4. A more slender specimen, showing the amount of compression, and the obliquity of the annulations, with the septal sutures intersecting them by planes oblique to the axis of the tube, and to the direction of the annulations. *Cazenovia, N. Y.*

Fig. 5. A small, septate fragment, preserving the characteristic, fine, longitudinal striæ over the exterior of the tube. *Hamilton, N. Y.*

Fig. 6. The chamber of habitation nearly entire, showing the absence of annulations near the aperture, and a portion of a broad retral curve in the annulations over one side.

Fig. 7. A fragment showing the increase in the distance and prominence of the annulations from the apex toward the outer chamber. *Otisco Lake, N. Y.*

Fig. 8. A compressed fragment, exhibiting the same characteristics as the preceding specimen. *Hamilton, N. Y.*

Fig. 9. A lateral view of the same, showing the amount of compression.

Fig. 11. A portion of the surface enlarged from specimen fig. 5, showing the fine, regular, longitudinal striæ. Two of the septal sutures are shown in the upper furrow.

Fig. 12. A fragment of a large individual with more distant annulations. *Geneseo, Livingston county, N. Y.*

Orthoceras cælamen.

Page 298.

See Plates 43, 82, 113.

Fig. 10. An imperfect specimen, retaining portions of the test, and showing about twenty annulations. *North Bristol, Ontario county, N. Y.*

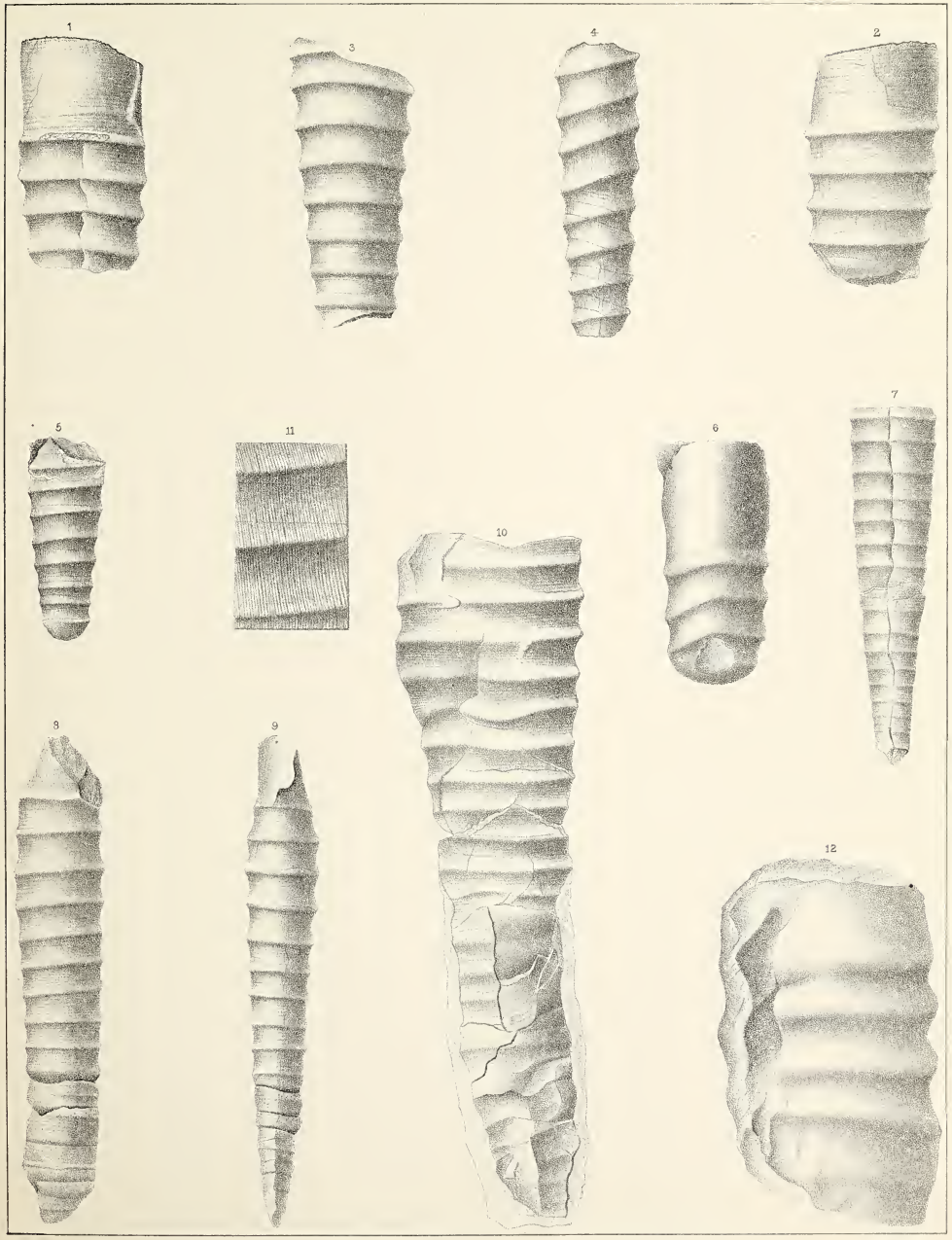
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PLATE XLIII.

Orthoceras multicinctum.

Page 263.

Fig. 1. A small specimen, showing rapid expansion and closely arranged annulations. Schoharie grit. *Schoharie, N. Y.*

Fig. 2. A larger individual, showing a contraction of the tube toward the aperture. This specimen and the above are the types of this species. Schoharie grit. *Schoharie, N. Y.*

Fig. 3. A septate fragment of another individual, showing the air-chambers, with the annulations greatly obscured by weathering. Schoharie grit. *Schoharie, N. Y.*

Orthoceras nuntium.

Page 299.

See Plate 82.

Fig. 4. A small specimen from the soft shales of the Hamilton group, preserving the characters of the test.

Fig. 5. An enlargement of the lower extremity of the preceding specimen, showing the surface-markings and other characters.

Fig. 6. A larger individual which is extremely compressed. From the shore of *Lake Erie.*

Fig. 7. An enlargement of the surface from the preceding specimen, showing an alternating character in the striæ.

Fig. 8. A fragment retaining nearly its normal proportions, and showing septa throughout the greater part of its length—a feature which is scarcely indicated in the figure. *Cazenovia, N. Y.*

Fig. 9. A small specimen, in which the lower part is coated with polished, striated shale (*slickensides*), obscuring the characters of the shell. *Seneca Lake, N. Y.*

Fig. 10. A compressed fragment, retaining a portion of the test, on which the striæ are much sharper than in fig. 7, which represents the surface of the internal mould. *Geneseo, N. Y.*

Fig. 13. A small, compressed fragment which shows the annulations as sharply elevated, rounded ridges, with flattened interspaces. This feature is not fully represented in the figure. *West Bloomfield, N. Y.*

Fig. 14. A large portion of an individual, presenting characters similar to the preceding. From the soft shales of the Hamilton group at *Geneseo, N. Y.*

Orthoceras Idmon.

Page 302.

Fig. 11. A small fragment showing the frequency and character of the annulations. The specimen is somewhat compressed, giving a curvature and unnatural obliquity to some of the annulations.

Fig. 12. An enlargement of the surface, showing the regular, continuous, longitudinal striæ. Hamilton group, *Moscow, N. Y.*

Orthoceras cælamen.

Page 298.

See Plates 42, 82, 113.

Fig. 15. Enlargement of the surface of a fragment, preserving its form in an uncompressed condition, and perfect state of preservation, showing the longitudinal striæ frequently interrupted by the lamellose lines of growth. Hamilton group. *Seneca Lake, N. Y.*

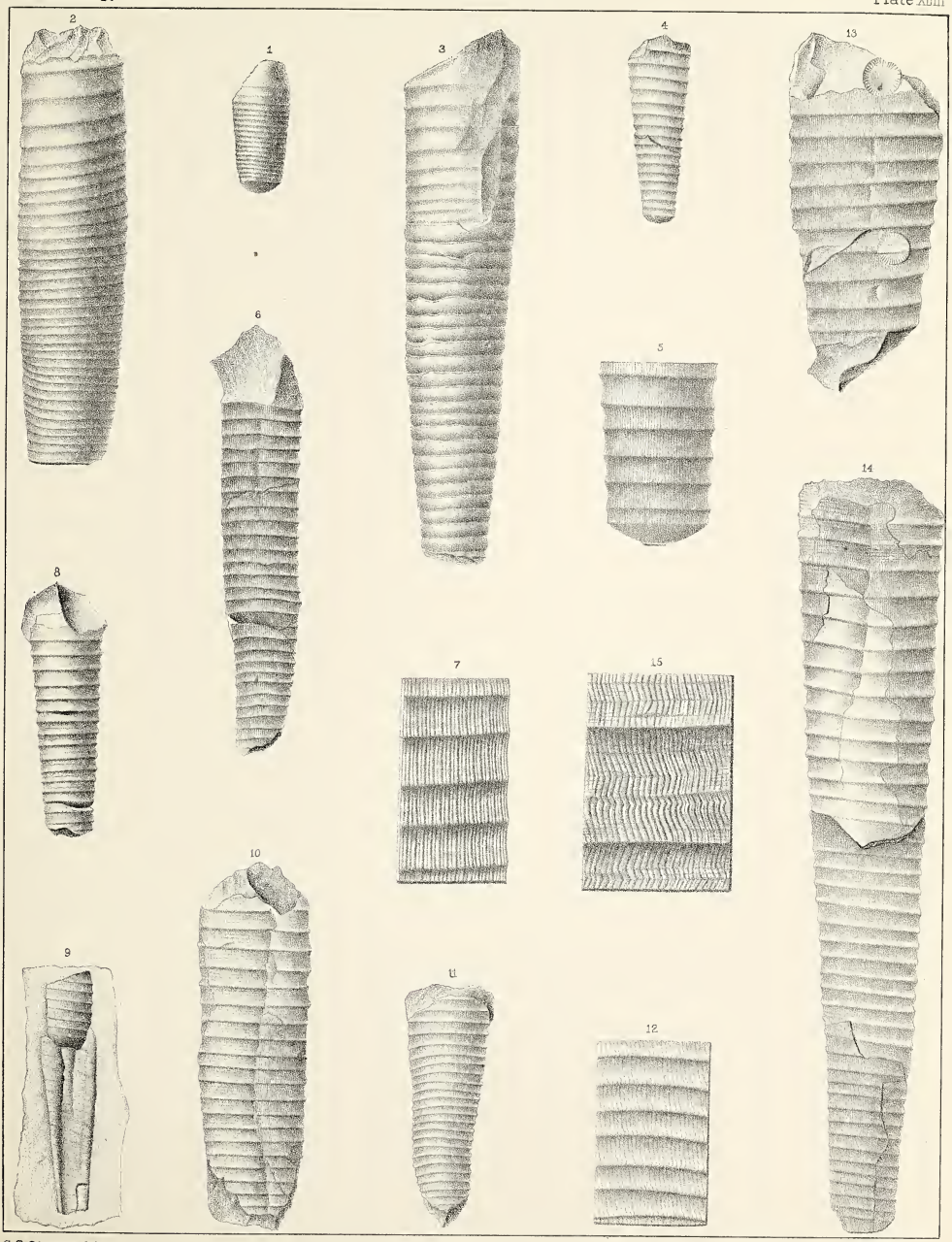
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PLATE XLIV.

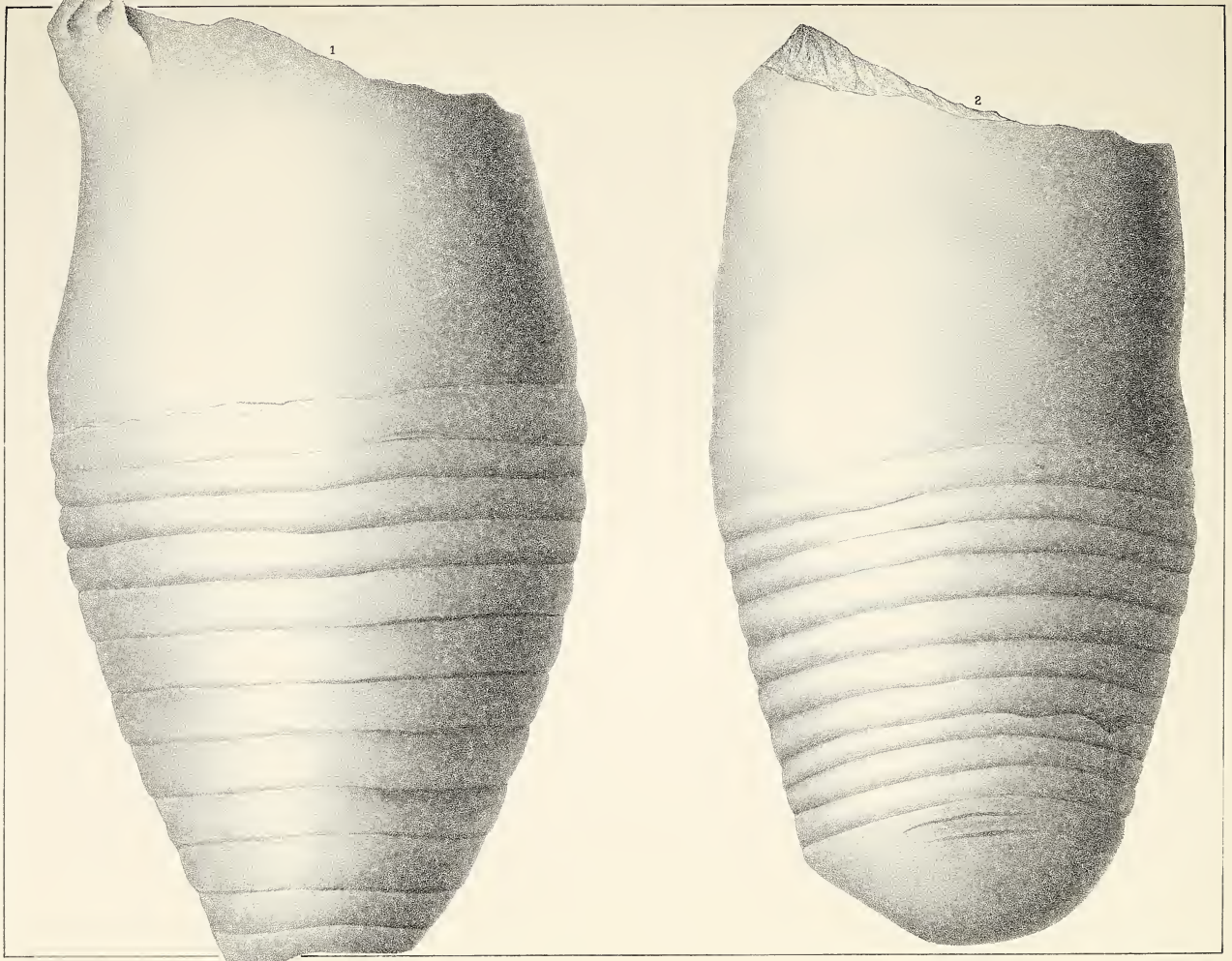
GOMPHOCERAS EXIMIUM.

Page 329.

Fig. 1. An individual slightly compressed, preserving a large portion of the chamber of habitation and thirteen air-chambers; showing the gibbosity of the shell and the slope of the sides toward the aperture. *Columbus. O.*

Fig. 2. A smaller individual, much disturbed by compression, and showing some variation in the depth of the air-chambers, compared with the preceding.

The specimen is from the lower limestone of the Upper Helderberg group, in the vicinity of *Buffalo, N. Y.*



H.M.Martin del. P.Riemann lith.

PLATE XLV.

Gomphoceras oviforme.

Page 344.

See Plates 46, 94.

Fig. 1. A view of the aperture of a specimen showing the comparative size and relations of the large and small apertures. Goniatite limestone of the Marcellus shale, near *Manlius, N. Y.*

Fig. 2. Dorsal view of a specimen, showing the general form of the shell and the truncated apex. The apical portion is not fully represented, the specimen preserving considerable more of the test covering the apex than is represented in the figure. A fragment of the test is preserved on the chamber of habitation, showing the fine, lamellose lines of growth. Goniatite limestone. *Schoharie, N. Y.*

Fig. 3. The aperture of the preceding specimen, which is somewhat larger in proportion to the diameter of the tube than in the specimen shown in fig. 1.

Fig. 4. A view of the aperture of another individual, which exhibits a considerable variation from the preceding specimens in the position of the aperture and the non-symmetrical arrangement of the large and small apertures. Goniatite limestone. *Schoharie, N. Y.*

Gomphoceras Fischeri.

Page 336.

Fig. 5. Lateral view of an individual, showing its fusiform shape and the crenulated zone at the base of the chamber of habitation, with the furrows continued over the walls of the air-chambers. A fragment of the test, showing the surface-markings, is preserved over a small portion of the air-chambers. The apical portion is partially restored, and represents a much smaller apical angle than is indicated in the other specimens of the species. Goniatite limestone, near *Manlius, N. Y.*

Fig. 6. Represents a fragment of another specimen from the same locality, preserving the shell over the entire surface of the tube, and showing the broad sinus of the striæ over the ventral side.

(GOMPHOCERATIDÆ .)

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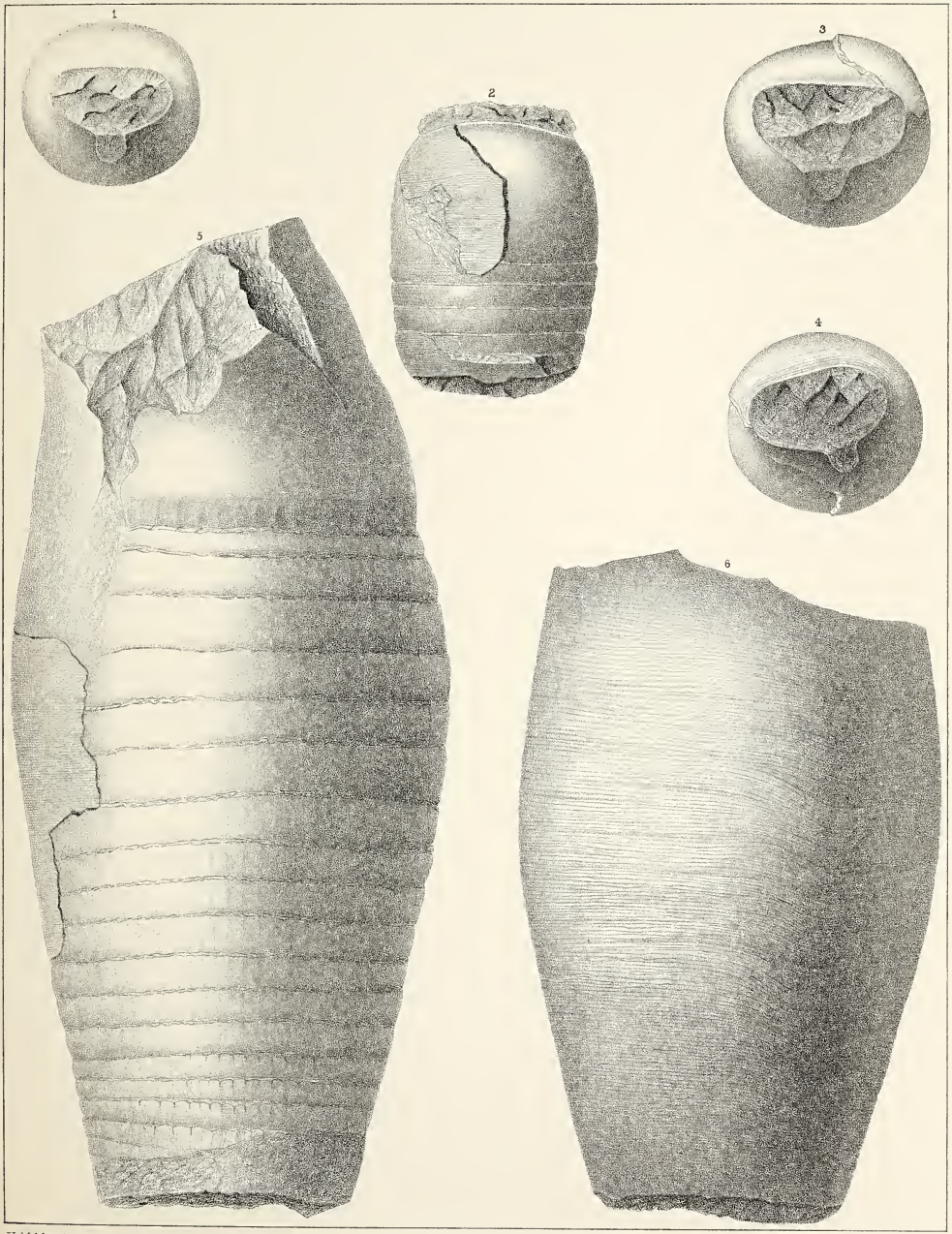
Plate XV.



H.M.Martin del.

P.Riemann lith.

PLATE XLVI.

Gomphoceras Conradi.

Page 348.

Fig. 1. Lateral view of a small individual, showing the endogastric curvature of the tube, the furrows of the crenulations at the base of the chamber of habitation, and the concentric striæ of the test over the septate portion. Goniatite limestone. *Manlius, N. Y.*

Fig. 2. Ventral view of the preceding, showing the small aperture and the form of the shell.

Fig. 3. Ventral view of the chamber of habitation of a larger individual, showing the constriction of the tube near the aperture, and the narrow, crenulated zone at the base. Goniatite limestone. *Manlius, N. Y.*

Gomphoceras beta.

Page 326.

Fig. 4. An individual considerably compressed, preserving the greater portion of the chamber of habitation and air-chambers. The curvature of the sutures is due to compression. Schoharie grit. *Schoharie, N. Y.*

Fig. 5. Ventral view of the chambered portion of another individual, showing the impression left by the removal of the siphuncle in the process of weathering. Schoharie grit. *Schoharie, N. Y.*

Gomphoceras oviforme.

Page 344.

See Plates 45, 94.

Fig. 6. A small, globose individual, showing the general form of specimens of this size. The epidermal layer of the test has been exfoliated at the apical portion of the tube, showing the markings and structure of the nacreous layer. Goniatite limestone. *Schoharie, N. Y.*

Fig. 7. An enlargement of the surface of the apical portion of the preceding, showing the characters of the nacreous layer of the test.

Gomphoceras absens.

Page 324.

Fig. 8. Lateral view of a fragment showing the curvature of the tube. Schoharie grit. *Schoharie, N. Y.*

Fig. 9. Ventral view of the preceding, showing the enlargement of the tube, the regularity of the air-chambers, and the impression of the siphuncle, which has been removed in the process of weathering.

Phragmoceras? expansum.

Figs. 10, 10. This specimen is erroneously figured on this plate as from the Hamilton, but belonging to the Coralline limestone of the Niagara group. *See Addenda for explanation.*

The representation of the siphuncle is incorrect; the specimen shows it to be on the concave side of the tube.

Cyrtoceras alternatum.

Page 365.

Fig. 12. Ventral view, showing the undulations of the tube and the siphuncle, as exposed in the process of weathering. The undulations and rounded nodes on the tube are not fully represented in the figure. Goniatite limestone. *Schoharie, N. Y.*

Fig. 13. Lateral view of the preceding, showing the curvature of the tube.

Gomphoceras clavatum.

Page 323.

See Plate 93.

Fig. 14. Lateral view, showing the endogastric curvature of the tube and the comparative convexity of the dorsal and ventral sides. Schoharie grit. *Albany county, N. Y.*

Fig. 15. A view of the convexo-dorsal side of the preceding, showing the form of the tube and the depth of the air-chambers.

(CYRTOCERATIDÆ.)

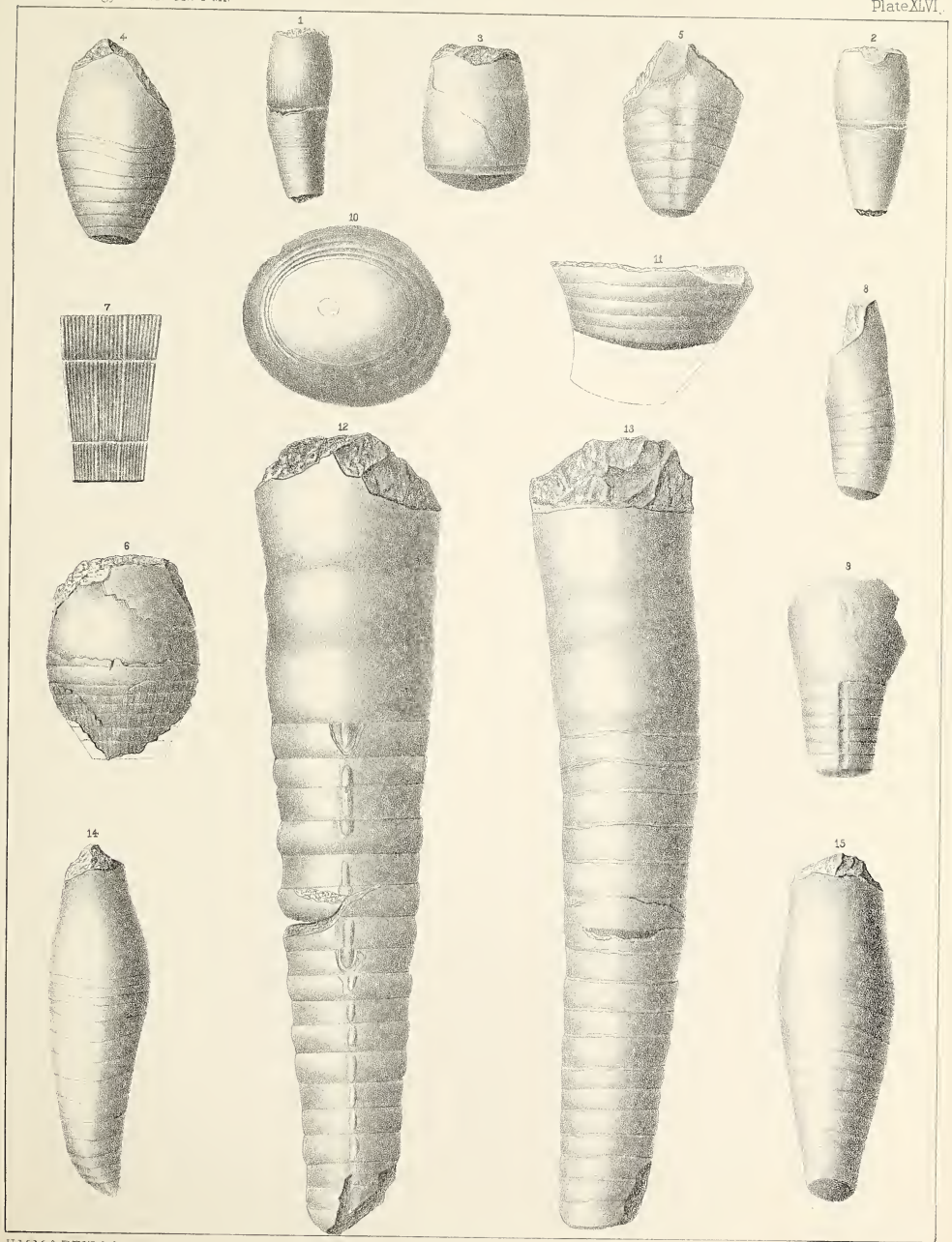


PLATE XLVII.

Cyrtoceras (Gomphoceras) metula.

Page 360.

See Plate 111.

Fig. 1. Ventral view of a chambered fragment, showing the enlargement of the tube and the depth of the air-chambers.

Fig. 2. Lateral view of the preceding, showing the amount of the curvature of the tube. Upper Helderberg limestone. *Clarence Hollow, N. Y.*

Cyrtoceras morsum.

Page 367.

Fig. 3. Ventral view of a fragment which is imperfect at the apex, showing traces of the transverse costæ of the test and the slight sinus along the ventrum.

Fig. 4. Lateral view of the preceding, showing the curvature of the tube. This specimen is the type of the species, and is from the Upper Helderberg limestone. *Clarence Hollow, N. Y.*

Cyrtoceras eugenium.

Page 369.

See Plates 36, 96, 97.

Fig. 5. Lateral view of an individual nearly entire, showing the straight outer portion and curved apex. Several fragments of the test, preserving the surface-markings and ornaments, are adhering to parts of the tube. The internal mould preserves the furrows of the crenulations and the annulations marking the exterior ridges of the test.

Fig. 6. Ventral view showing the sinus of the ornaments and aperture, with the variation in the prominence and frequency of the annulations and transverse ridges toward the apex and near the aperture.

Fig. 7. Dorsal view of the straight portion of a large individual showing a slight gibbosity, due to the gradual contraction of the tube toward the aperture. The dorsal margin of the aperture is shown to be continuous and entire. In this example the prominent expansions of the test become obsolescent toward the aperture, where the shell is marked by lamellose lines of growth.

These specimens are from the Upper Helderberg limestone, at *Schoharie, N. Y.*

Gyroceras spinosum.

Page 382.

See Plates 48, 49, 98, 99.

Fig. 8. Ventral view of a compressed specimen, showing the nummuloid elements of the siphuncle, as exposed in the process of weathering. Schoharie grit. *Schoharie, N. Y.*

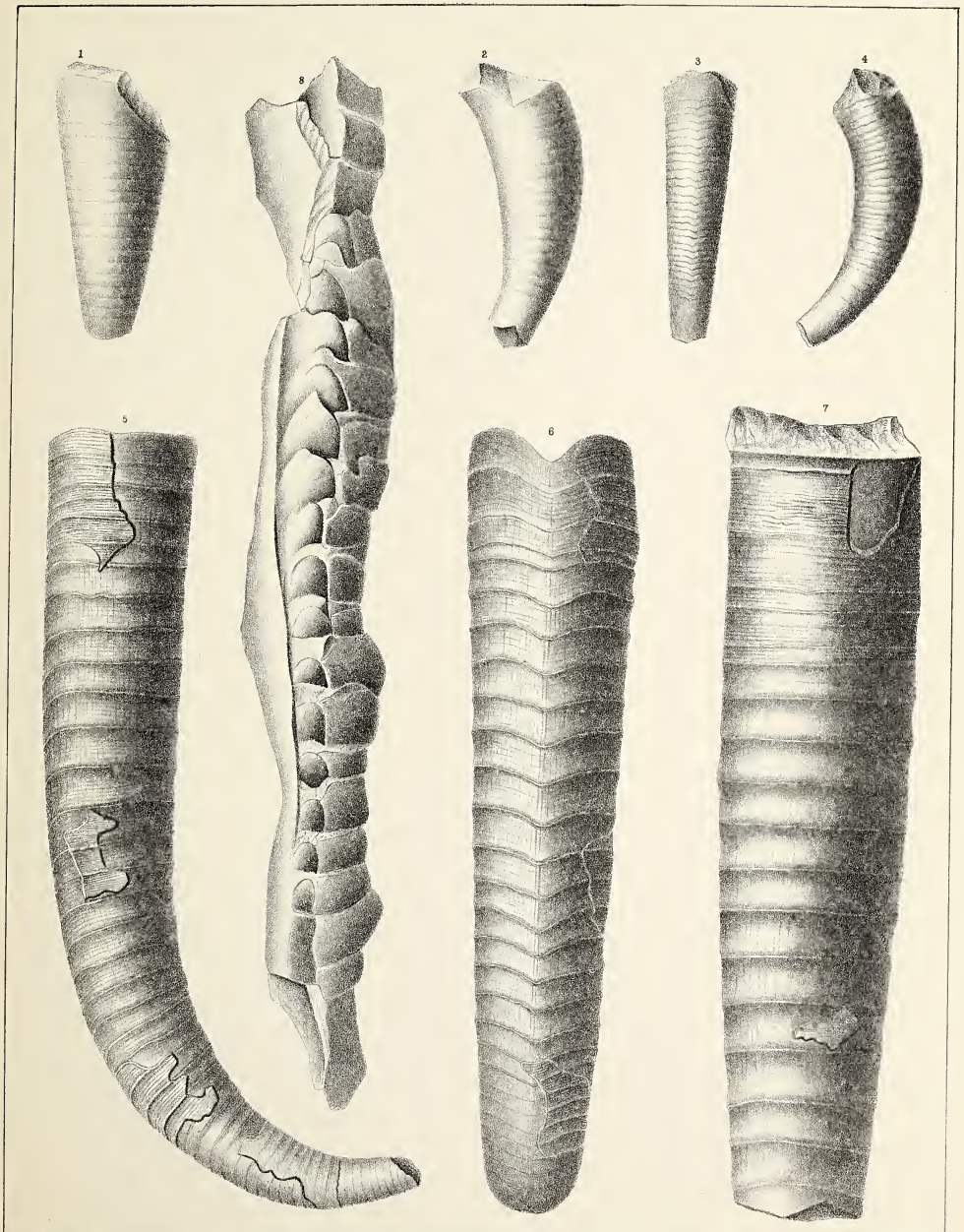

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PLATE XLVIII.

GYROCERAS SPINOSUM.

Page 382.

See Plates 47, 49, 98, 99.

Fig. 1. A chambered fragment, showing the inner volution of the shell and the bases of one of the lateral rows of spines. The air-chambers near the apex are numerous, becoming gradually deeper toward the aperture. Schoharie grit. *Schoharie, N. Y.*

Fig. 2. A small, compressed fragment, showing somewhat deeper air-chambers than in the preceding specimen. *Schoharie, N. Y.*

Fig. 3. Lateral view of a fragment, preserving its natural, uncompressed form, showing portions of the test and the bases of several of the lateral and ventral spines. *Schoharie, N. Y.*

Fig. 4. Lateral view of a portion of the outer volution, preserving the chamber of habitation, with about twenty air-chambers. The bases of two lateral rows of spines are obscurely shown in the specimen, as represented in the figure. *Schoharie, N. Y.*

Fig. 5. Ventral view of a small, well-preserved individual, showing the enlargement of the tube, the sinus in the striæ, and the two rows of spines, with the revolving ridges ornamenting the ventral side of the tube. A lateral view of this specimen is given on plate 98. *Schoharie, N. Y.*

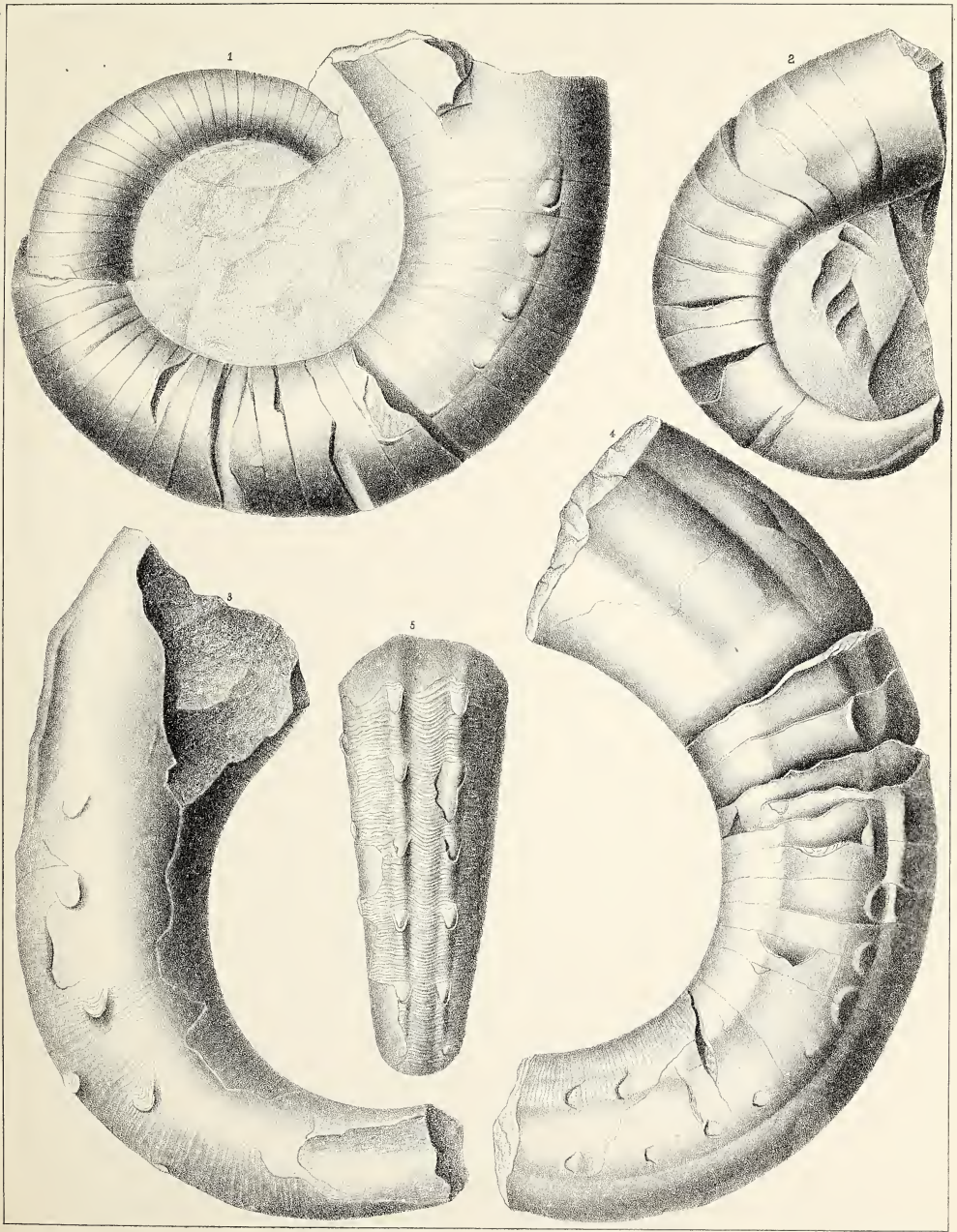
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PLATE XLIX.

GYROCERAS SPINOSUM.

Page 382.

See Plates 47, 48, 98, 99.

Fig. 1. Lateral view of a large, compressed fragment, showing the curvature of the tube and the depth of the air-chambers. On the concavo-dorsal side the test is preserved, and shows the undulating, lamellose lines of growth. Schoharie grit. *Schoharie, N. Y.*

GYROCERAS VALIDUM.

Page 385.

See Plate 100.

Fig. 2. Lateral view of a large fragment, preserving the chamber of habitation and twenty-six attached air-chambers, showing the curvature and form of the shell, with no traces of a prominent ornamentation of the test preserved on the internal mould. Schoharie grit. *Schoharie, N. Y.*

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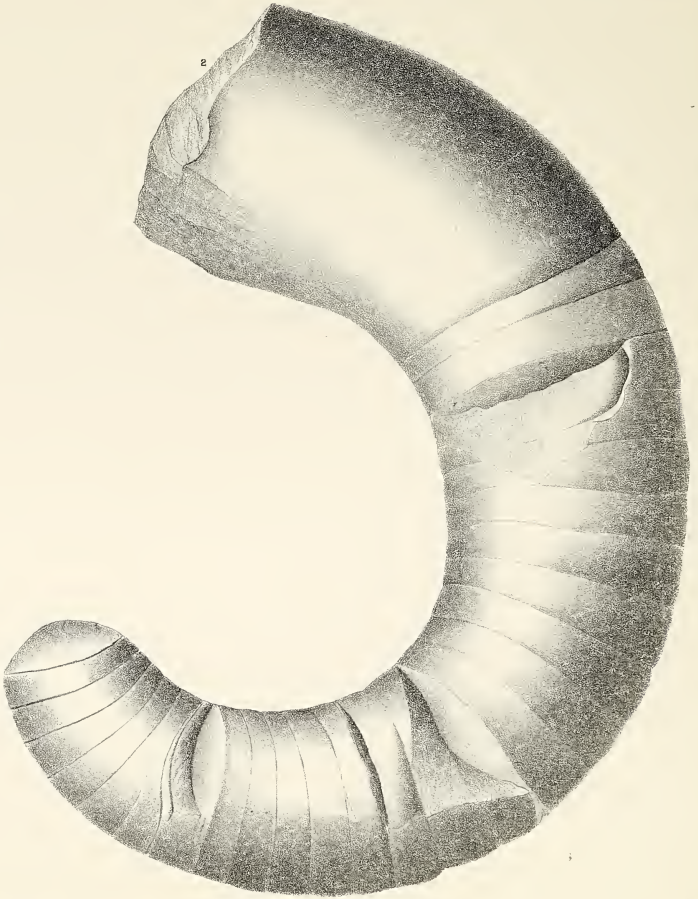
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PLATE L.

Cyrtoceras Jason.

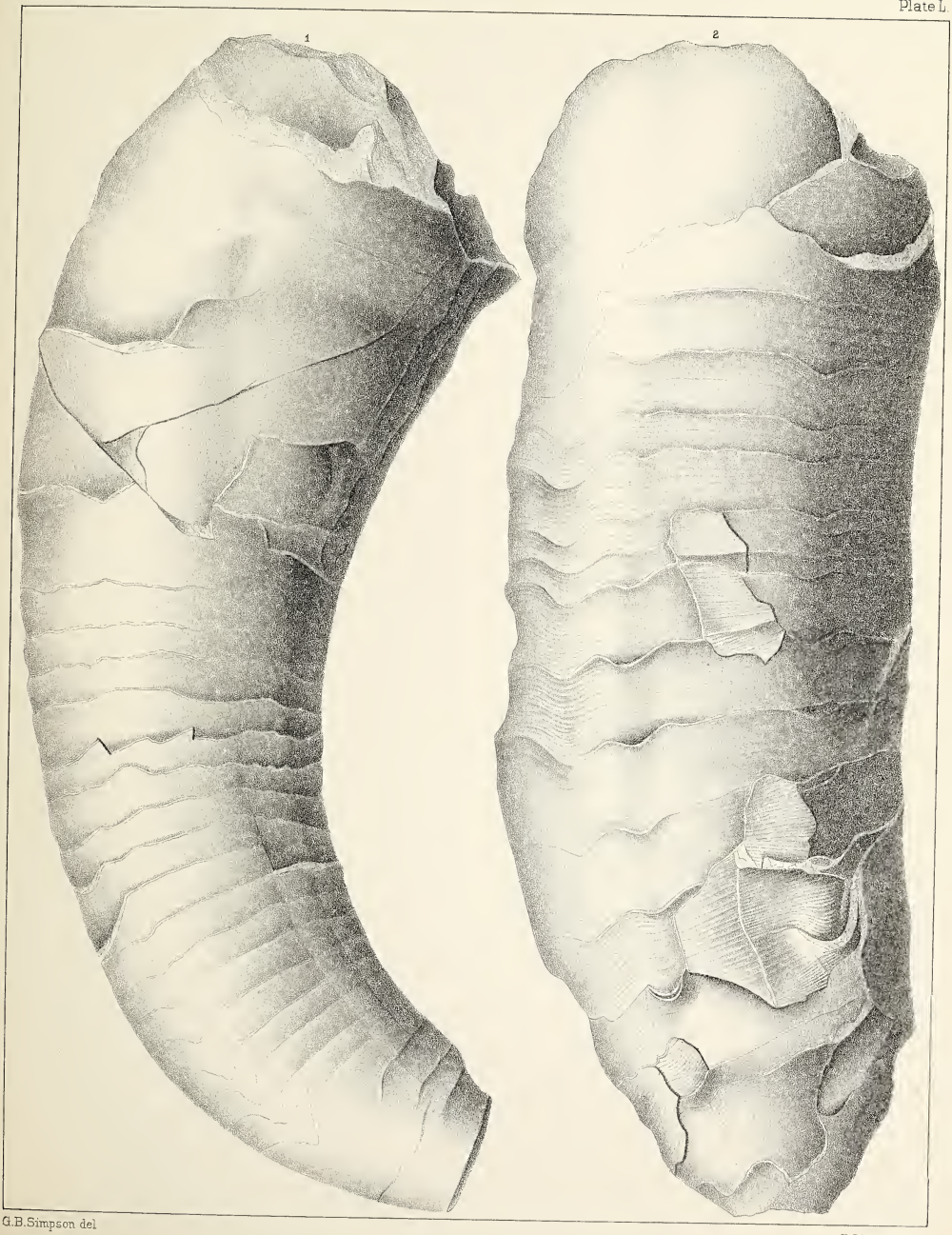
Page 381.

Fig. 1. A large fragment, preserving the grand chamber and a portion of the air-chambers, showing the curvature of the tube and the depth of the air-chambers. Toward the apex there is a sinus in several of the septal sutures, produced by the spinous processes of the test.

Fig. 2. A fragment of a large individual, preserving the natural form of the shell, showing the hexangular form of the tube and the sinus of the ornaments on the ventral side. Several fragments of the test are preserved, with the lamellose surface-markings. The internal mould retains the impression of the furrows and striæ of the crenulations, with the bases of the spines on the obtuse angles of the tube.

The specimens of this species here illustrated are from the Schoharie grit, *Schoharie, N. Y.*

(CYRTOCERATIDÆ .)



G.B.Simpson del

P.Riemann lith

PLATE LI.

Cyrtoceras citum.

Page 372.

Fig. 1. Lateral view of a small fragment showing the curvature of the tube, and the regular numerous annulations of the internal mould corresponding to the transverse ridges of the test.

Fig. 2. Ventral view of the preceding, showing the characters of the sinus in the lamellæ.

Fig. 3. Longitudinal section of a fragment of another individual, showing the curvature and enlargement of the tube, but preserving no traces of the septa.

The specimens of this species here illustrated are from the Upper Helderberg limestone, at *Schoharie, N. Y.*

Gyroceras Nereus.

Page 373.

Fig. 4. Lateral view of an individual, showing the depth of the air-chambers and the curvature of the tube.

Fig. 5. The opposite view of the preceding which preserves, on this side, portions of the test with its ornaments.

Fig. 6. A portion of the surface enlarged, showing the plicate ridges and the fine, undulating lines of growth. Upper Helderberg limestone. *Auburn, N. Y.*

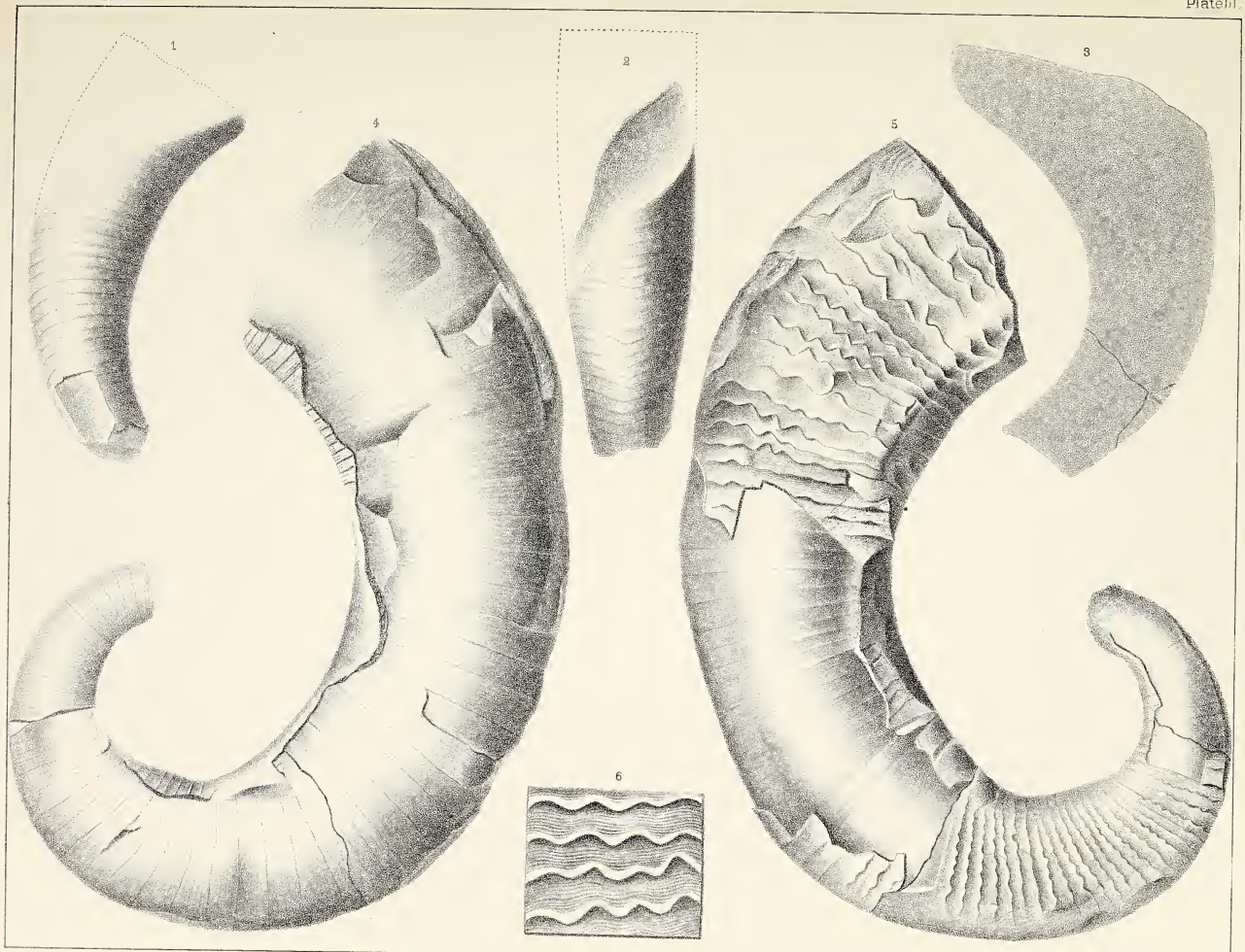

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PLATE LII.

GYROCERAS TRIVOLVE.

Page 374.

See Plate 52 A.

Fig. 1. Ventral view of a nearly entire individual, showing the sinus in the ornaments of the test, and in the annulations of the internal mould. Upper Helderberg limestone. *Schoharie, N. Y.*

Fig. 2. Dorsal view of the preceding.

Fig. 3. Lateral view of the same, showing the number of volutions and the characters of the internal mould.

Fig. 4. A portion of the outer volution of a larger individual, showing more distinctly the annulated character of the internal mould, with the rounded longitudinal ridges and striæ of the crenulations. *Schoharie, N. Y.*

Fig. 5. A longitudinal section preserving traces of the septa near the apex; but for the most part the internal characters have been destroyed.

Fig. 6. A longitudinal section of a small fragment, showing the depth of the air-chambers and the concavity of the septa. *Helderberg mountains.*

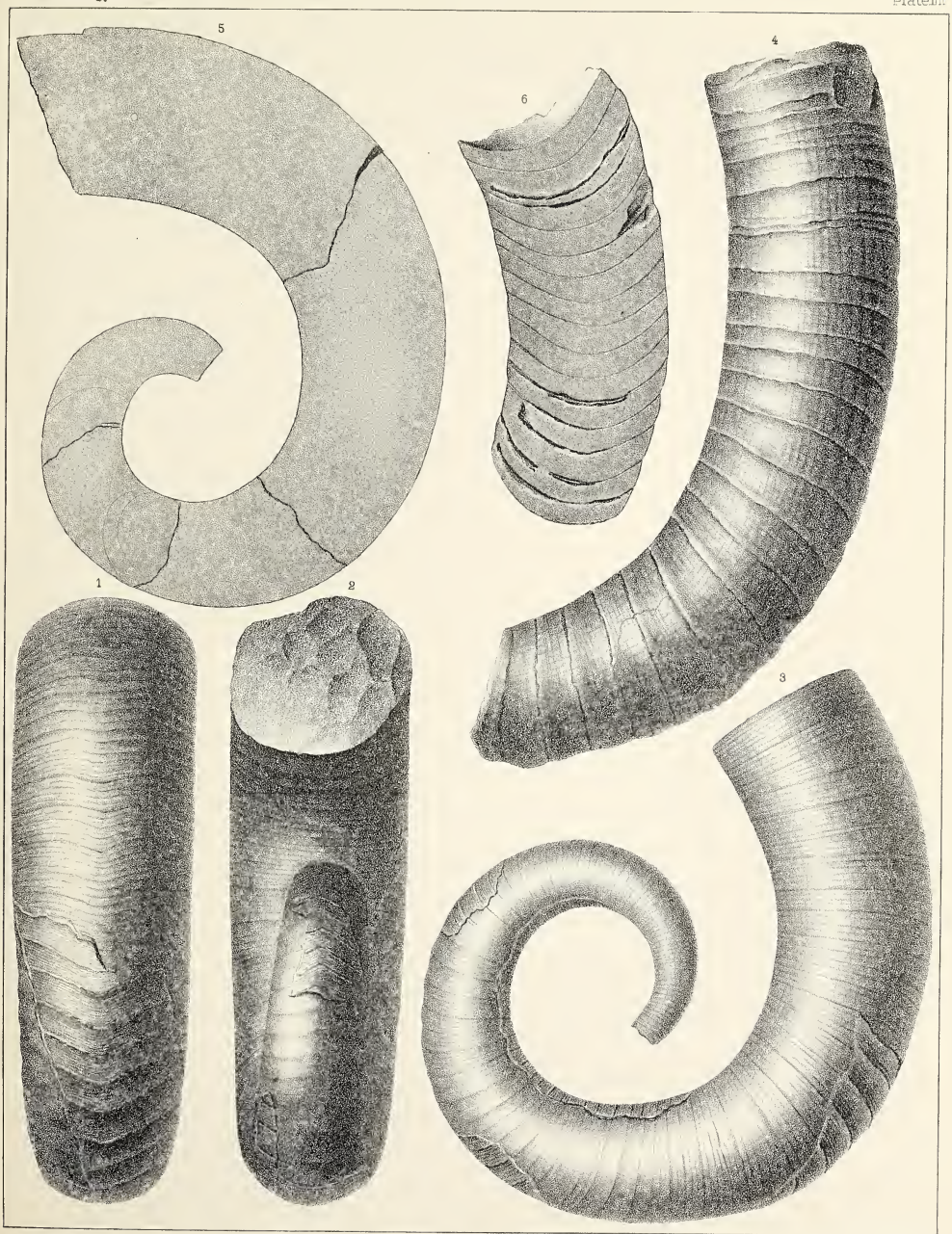
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PLATE LII A.

Gyroceras trivolve.

Page 374.

See Plate 52.

Fig. 1. Ventral view of a nearly entire individual, from which the test has been exfoliated, and showing the characters of the internal mould. Upper Helderberg. *Schoharie, N. Y.*

Fig. 2. Front view of the preceding.

Fig. 3. Lateral view of the same, showing the number of volutions, the enlargement of the tube, and a more open spire than is usually shown in the specimens.

Fig. 4. A longitudinal section of a small fragment, consisting of the chamber of habitation with two attached air-chambers.

Fig. 5. A longitudinal section of a fragment, showing the concave surface of a septum at the larger extremity, but no traces of septa throughout the length. The material filling the tube was apparently deposited after the breaking or solution of the septa and siphuncle.

Fig. 6. A longitudinal section of a portion of the outer volution of a specimen preserving the septa. The specimen shows the siphuncular tube, continuing through the cavities of the air-chambers, and more septa than are here represented toward the aperture.

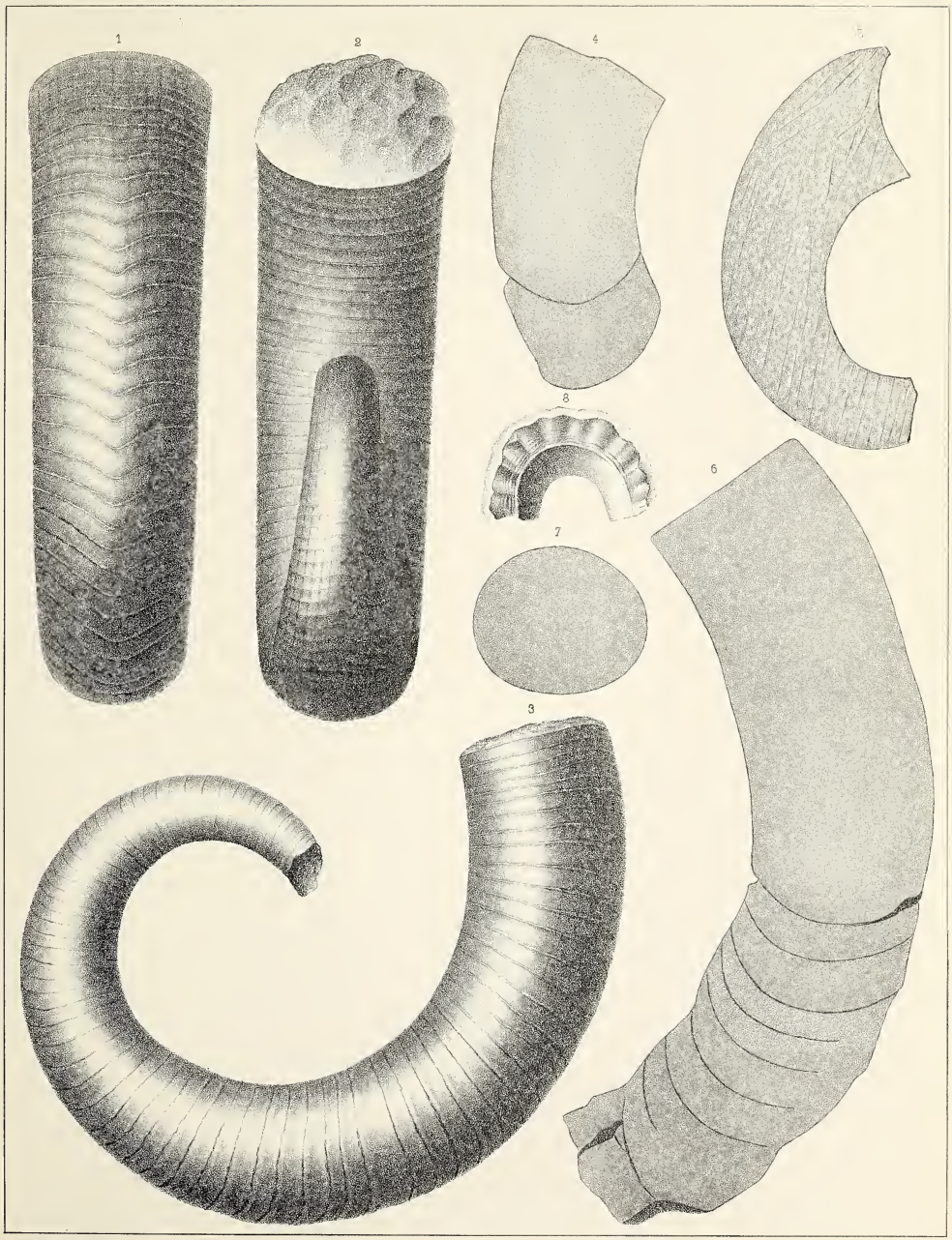
Fig. 7. A transverse section, showing the form of the tube toward the aperture.

Gyroceras laciniosum.

Page 376.

Fig. 8. An end view of the matrix of a small fragment, showing the regular plication of the transverse foliate expansions of the test.

(CYRTOCERATIDÆ .)



G.B.Simpson del.

Phil.Ast.lith.

PLATE LIII.

GYROCERAS UNDULATUM.

Page 378.

See Plate 54.

Fig. 1. Lateral view of a specimen showing the number of the volutions and the nodes on the internal mould, corresponding to the subtubular expansions or spines on the test. Upper Helderberg limestone. *Cherry Valley, N. Y.*

Figs. 3, 4. A septum and transverse section of a fragment, which is compressed, and does not show the natural broadly ovate, subtriangular form of the tube.

Fig. 5. A section of the disc of an example, showing the depth of the air-chambers, where the walls of the tube and the septa have not been destroyed. *Cherry Valley, N. Y.*

Fig. 6. Another septate fragment, showing the regularity in the depth of the air-chambers. *Cherry Valley, N. Y.*

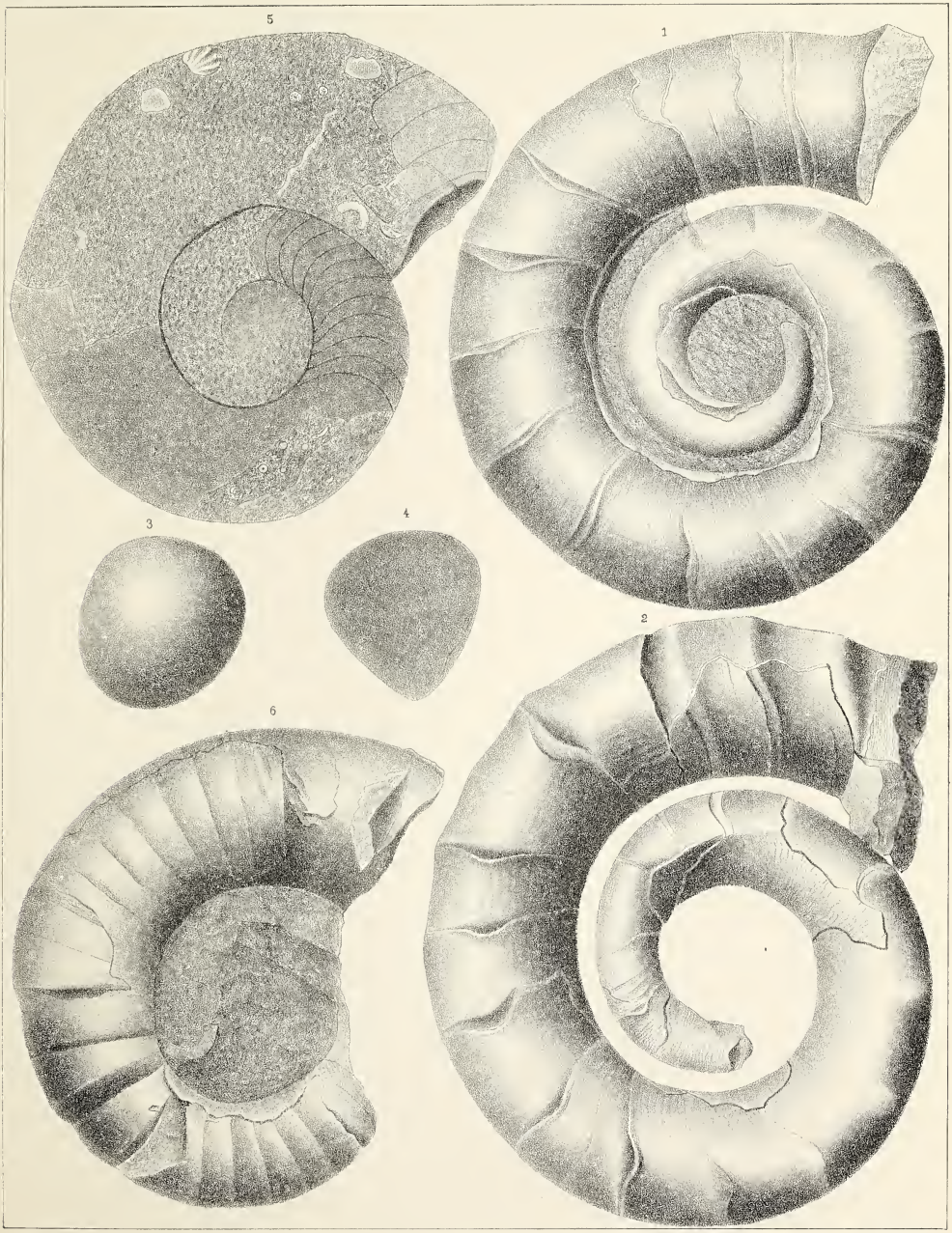

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PLATE LIV.

GYROCERAS PAUCINODUM.

Page 380.

Fig. 1. Ventral view, showing the broad, flat, ventral side, and the nodes on the ventro-lateral margins. Upper Helderberg limestone. *Cherry Valley, N. Y.*

Fig. 2. The opposite view of the same specimen, showing the transverse section of the tube and the distance between the volutions.

Fig. 3. Lateral view, showing the number of volutions and the nodes on the ventro-lateral angles. The specimen is a cast of the interior.

Fig. 4. A transverse section of the tube, showing its subtriangular, ovate form, with the broad ventral side.

GYROCERAS UNDULATUM.

Page 378.

See Plate 53.

Fig. 5. Lateral view of an imperfect specimen, preserving portions of the test, showing the curvature of the tube and the depth of the air-chambers. Upper Helderberg limestone. *Cherry Valley, N. Y.*

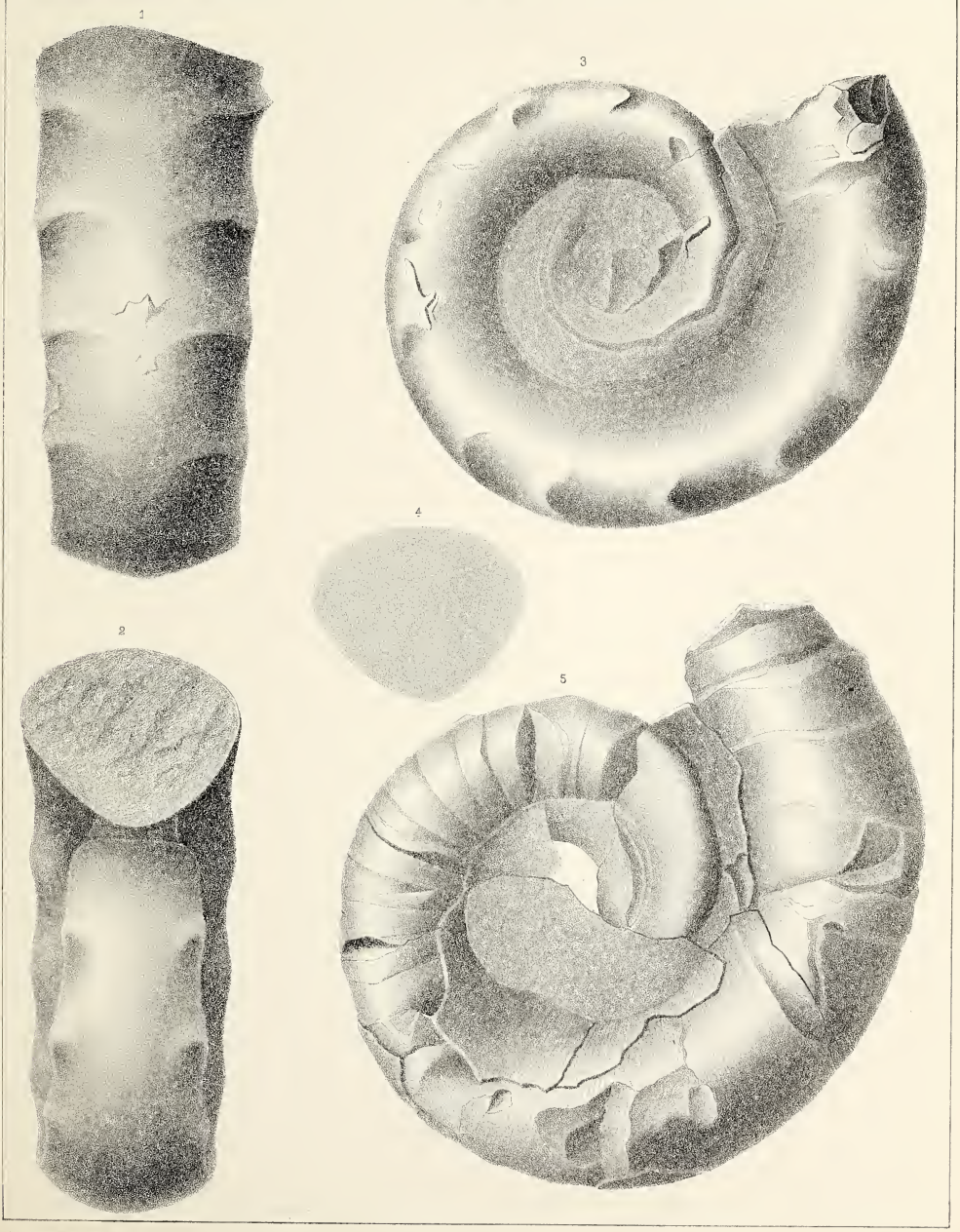
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PLATE LV.

Gyroceras Matheri.

Page 377.

Fig. 1. Front view of the internal mould of an individual, showing the character of the annulations on the dorsal side of the outer volution, and the sinus of the ornaments on the ventral side of the apical portion.

Fig. 2. Lateral view of the preceding, showing the volutions and the enlargement of the tube. The annulations and furrows of the crenulations are also shown. Upper Helderberg limestone, near *Catskill, N. Y.*

Fig. 3. Ventral view of a larger individual, showing the sinus of the annulations on the internal mould, and the extension of the transverse lamellæ into the surrounding matrix. Small fragments of the test are preserved on a portion of the tube, showing the surface-markings. *Schoharie, N. Y.*

Fig. 4. Lateral view of the preceding, showing the curvature of the tube and the frequency of the annulations. This specimen exhibits a common tendency of the last half of the outer volution to become straight, and directed outward from the general curve of the spire.

Fig. 5. A fragment showing more closely coiled volutions. The larger extremity shows the concave surface of a septum; but the longitudinal section, as represented, preserves no evidences of the air-chambers or siphuncle. *Schoharie, N. Y.*

Fig. 6. A septum showing the transverse section of the tube.

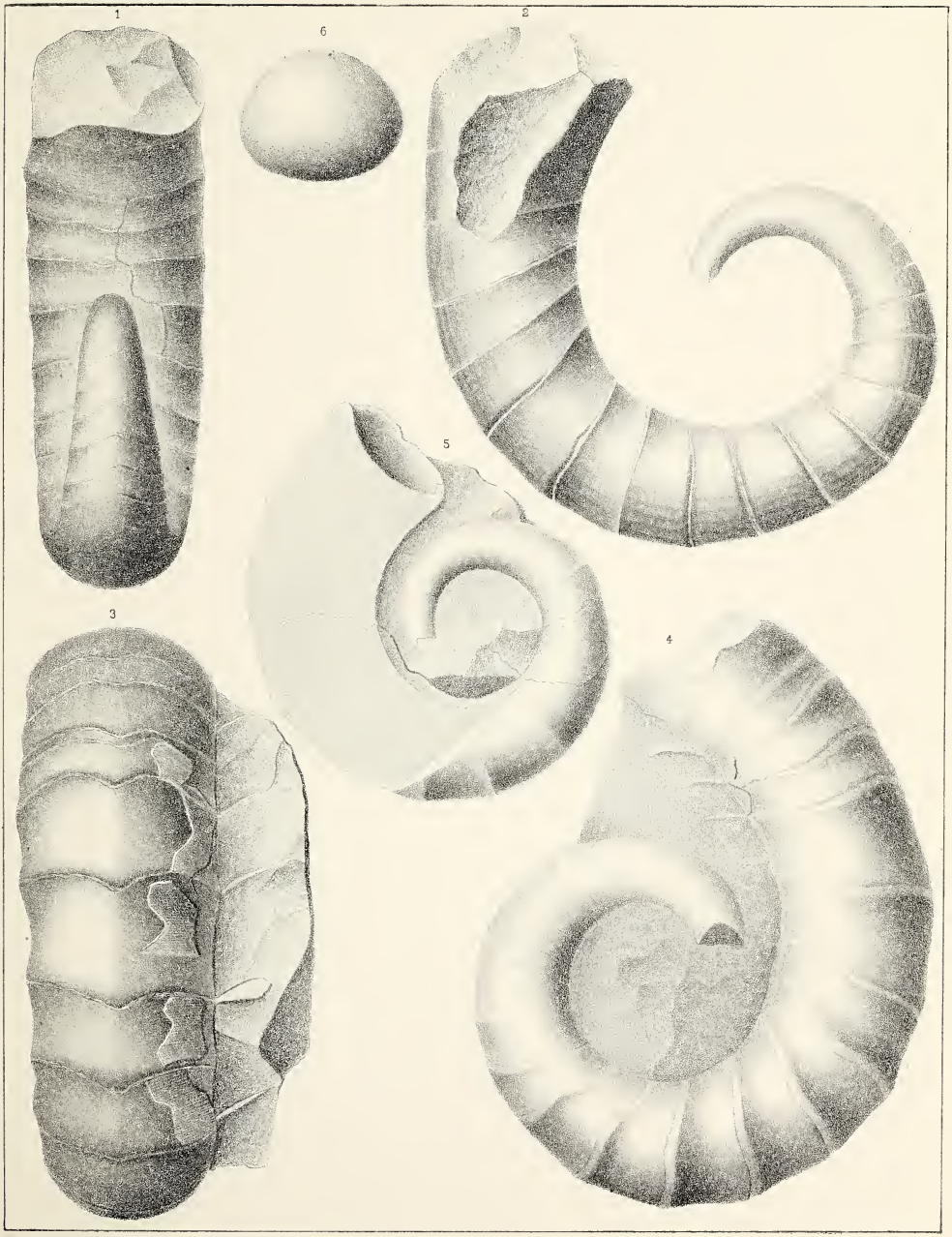
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PLATE LVI.

Gyroceras transversum.

Page 384.

Fig. 1. Lateral view of a large fragment, showing the curvature and enlargement of the tube, and the rows of rounded nodes over the chambered portion. The strong test is shown covering the dorsal side of the tube. The arching, transverse striæ, represented on the chamber of habitation, do not exist on the specimen. Goniatite limestone of the Marcellus shale. Near *Manlius, N. Y.*

Fig. 2. Ventral view of the preceding, showing the sinus in the margin of the aperture, the crenulated zone at the base of the grand chamber, and the profile of the nodes on the sides of the tube.

Fig. 3. Ventral view of a smaller septate fragment, showing the variation in the depth of the air-chambers toward the apex, and a longitudinal, flattened band along the ventrum. Goniatite limestone. Near *Manlius, N. Y.*

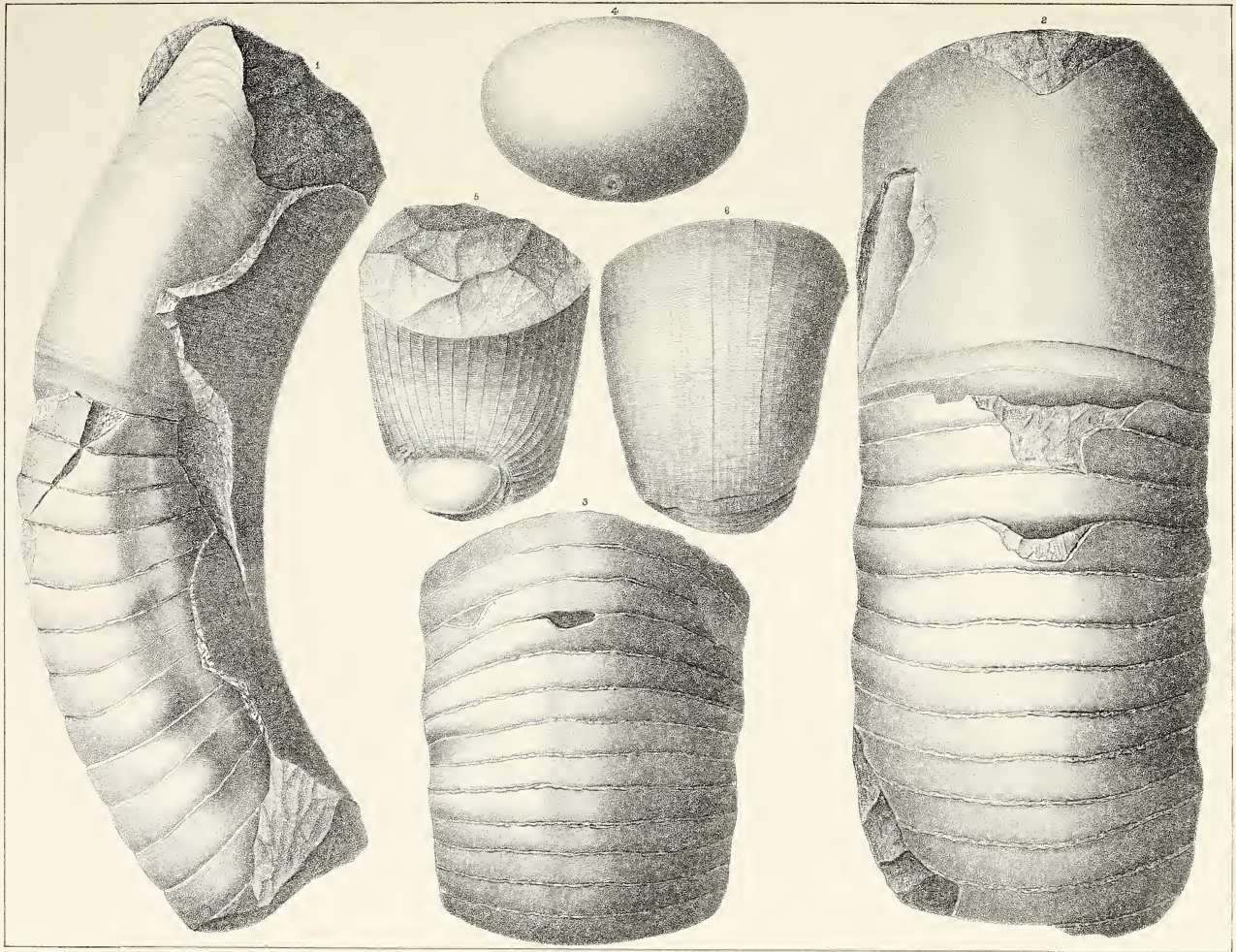
Fig. 4. A septum of the preceding, showing the size and position of the siphuncle on the convex ventral side of the tube.

Nautilus liratus, var. juvenis.

Page 411.

Fig. 5. The dorsal side of the specimen, preserving the grand chamber and several imperfect air-chambers, showing the broad elliptical aperture, and the slender, carinate revolving striæ, with fine transverse striæ. The position of the siphuncle cannot be satisfactorily determined, and is not represented. Hamilton shales. *Cazenovia, N. Y.*

Fig. 6. The ventral side of the same specimen, showing the revolving striæ much subdued, while the transverse striæ are essentially the same as on the opposite side. The specimen is free from weathering or wearing, and the surface-markings are in their natural condition.



G.B.Simpson del.

P.Hiemann lith.

PLATE LVII.

Gomphoceras? planum.

Page 352.

Fig. 1. The ventral side of a fragment of the species, carrying seven air-chambers and the base of the chamber of habitation.

Fig. 2. The convex side of a septum, showing the size and position of the siphuncle. *Borodino, Skaneateles lake, N. Y.*

Nautilus liratus.

Page 407.

See Plate 60.

Fig. 3. A lateral view of a partially compressed specimen, which is a cast of the interior, preserving only strong, revolving plications, of which there are nine on the lateral face of the chamber of habitation. Hamilton group. *Quarries north of Sherburne, Chenango county, N. Y.*

Nautilus subliratus.

Page 409.

Fig. 4. A dorso-lateral view of a fragment, which preserves the greater part of the chamber of habitation and four of the attached air-chambers. The specimen is a cast of the interior, obliquely compressed, showing one-half of the dorsal side and a portion of the lateral face, and preserving five revolving plications.

Fig. 6. The ventral side of the grand chamber, with a few attached air-chambers. The central space is concave and essentially smooth, while on each side there are six revolving, angular plications. The transverse striæ are partially preserved.

Fig. 7. The ventral side of the preceding specimen, which preserves the evidence of several air-chambers at the base, the surface being marked by fine, sharply impressed, longitudinal striæ, which are cancellated by finer transverse striæ; but without any indication of the revolving ridges or plications. *Earlville, Madison county, N. Y.*

Fig. 5. A fragment of the chambered portion of a Nautilus, which is referred with doubt to this species. It is much larger than the chambered portion of any other individual which has been observed. The radiating plications which are so well defined in this specimen are barely perceptible, or obsolescent on the smaller individuals referred to this species. Hamilton group. *Basin Gulf, Skaneateles lake, N. Y.*

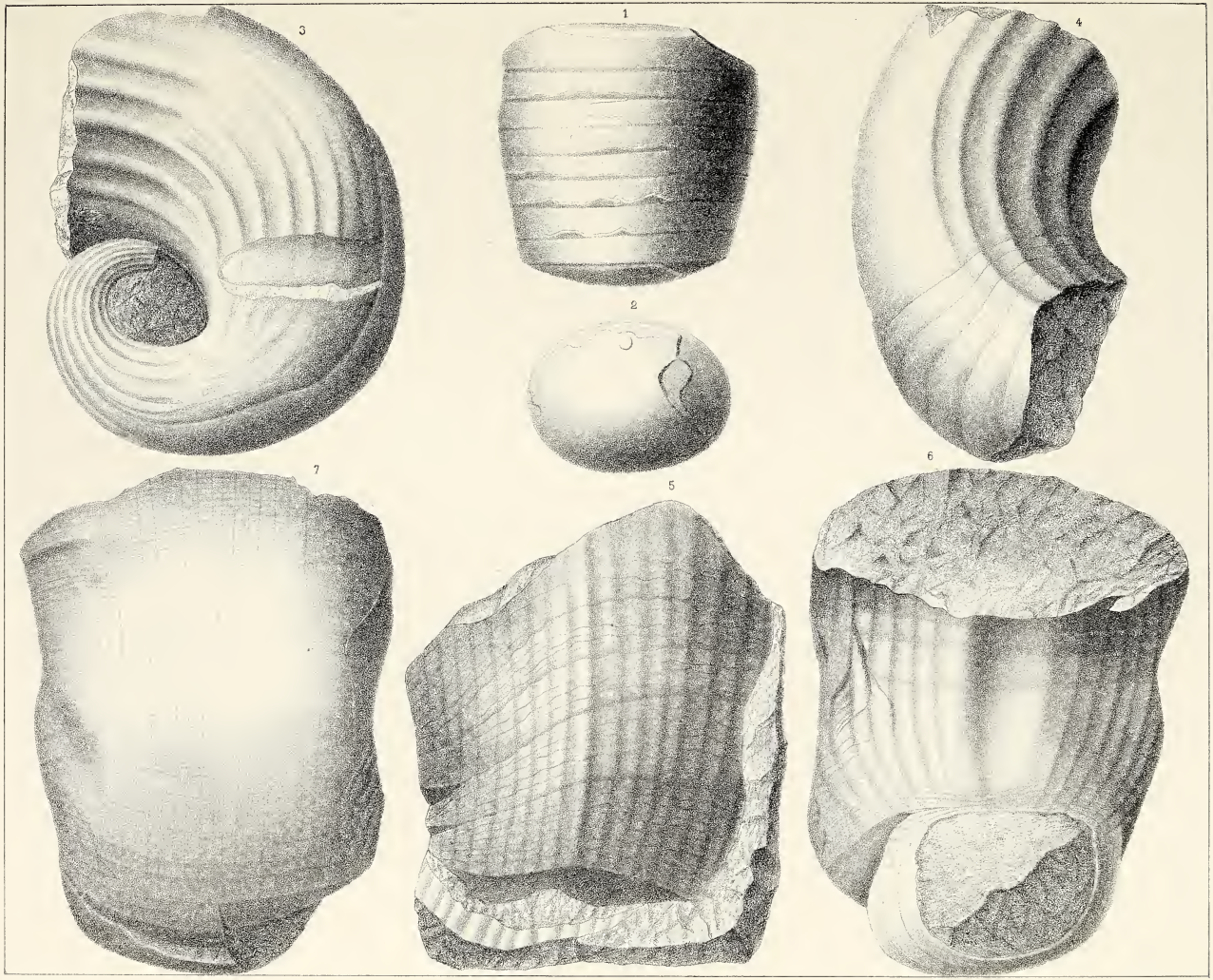

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PLATE LVIII.

Gyroceras Eryx.

Page 386.

See Plate 103.

Fig. 1. A septate fragment of this species, showing the curvature of the tube and the depth of the air-chambers. From Dolomitic limestone, referred to the Hamilton group, near *Milwaukee, Wis.*

Trochoceras Orion.

Page 397.

Fig. 2. Lateral view of a fragment, showing the curvature of the tube, the gibbous chamber of habitation becoming straight, and contracting near the aperture. The sinus represented on the dorsal side of the aperture is incorrect, and is not shown on the specimen. A broad sinus in the ventral margin corresponds to the sinus of the surface-markings on the convex side of the tube. Schoharie grit. *Helderberg mountains, N. Y.*

Trochoceras eugenium.

Page 396.

See Plate 59.

Fig. 3. Lateral view of a small, compressed specimen, showing the curvature of the tube and the depth of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Fig. 4. A small, compressed, septate fragment, referred to this species with doubt. The air-chambers are shallower than is usual in the species, and it may belong to the apical portion of *Gyroceras spinosum*, but does not preserve any remains of the revolving rows of spines. The obliquity of the septa and the slight deflection of the tube may be due to compression.

Trochoceras obliquatum.

Page 401.

See Plate 111.

Fig. 5. The concave dorsal side of a specimen, showing the transverse section of the tube and the want of symmetry in the curvature. The view is looking upon the specimen obliquely, which somewhat exaggerates the departure of the curvature from one plane. Schoharie grit. *Schoharie, N. Y.*

Trochoceras expansum.

Page 402.

See Plate 111.

Fig. 6. The concave dorsal side of a compressed septate fragment, showing the depth of the air-chambers, the curvature of the sutures, and the slight departure of the volution from one plane. Schoharie grit. *Schoharie, N. Y.*

Trochoceras Pandion.

Page 400.

See Plate 111.

Fig. 7. Lateral view of a fragment, showing the angular form of the tube, the depth of the air-chambers, and the obliquity of the septa. Traces of the siphuncle are seen on the convex ventral side as exposed in the process of weathering. Schoharie grit. *Schoharie, N. Y.*

Fig. 8. Lateral view of a specimen preserving about one volution, showing the curvature and form of the shell. The apical portion is much compressed, and the evidences of the air-chambers obliterated. Schoharie grit. *Schoharie, N. Y.*

Fig. 9. A septum of a fragment, showing the transverse section of the tube and the position of the siphuncle. Schoharie grit. *Schoharie, N. Y.*

UPPER HELDERBERG GROUP.

[Schoharie Grit.

(CYRTOCERATIDÆ.)

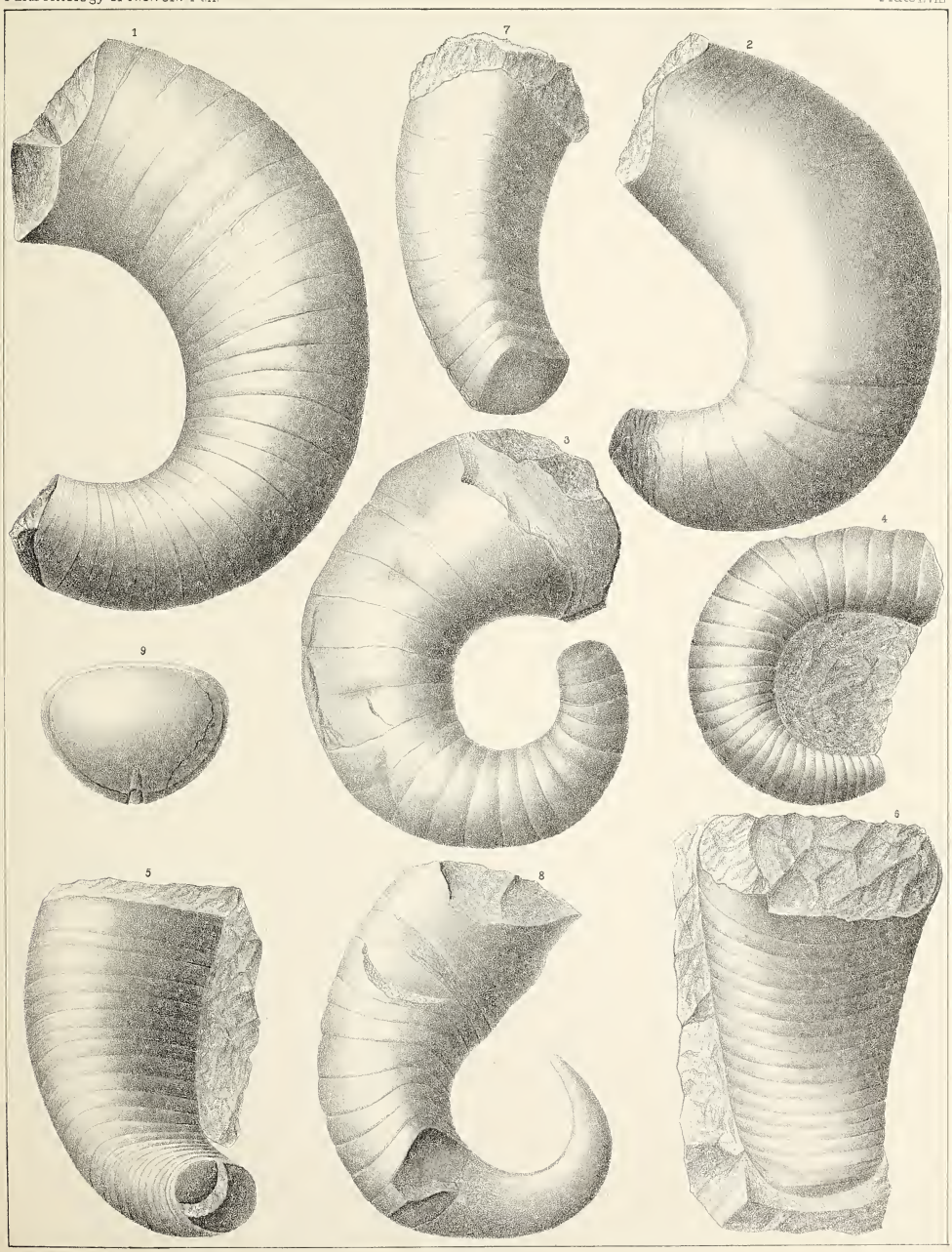

PLATE LIX.

Trochoceras Clio.

Page 392.

See Plate 111.

Fig. 1. The upper side of the internal mould of an individual, showing the depth of the air-chambers, and the extent of the grand chamber. The impression of one of the inner volutions is retained, showing the surface ornaments.

Fig. 2. The umbilical side of an individual, showing the diameter of the umbilicus, and the annulations and revolving striæ of the test. The septal sutures are less frequent, and oblique to the annulations.

Fig. 3. Profile view of the preceding, showing the deflection of the volutions.

Fig. 4. The concave dorsal side of the chamber of habitation, showing the transverse section of the tube; the position of the small siphuncle which is surrounded by an obscure areola, and the surface-characters on the inner side of the volution.

Fig. 5. A small individual nearly entire, showing the form of the shell, the number of volutions, and the height of the spire.

Fig. 9. A large individual, showing the numerous continuous annulations, and the gradually enlarging tube. The annulations are rounded on the outer volution, and are wanting on the chamber of habitation. The specimens of this species are from the Schoharie grit, at *Schoharie, N. Y.*

Trochoceras discoideum.

Page 394.

Fig. 6. Upper lateral view of a small individual, showing the depressed spire, the enlargement of the tube, the linear, transverse, annular nodes, and the revolving striæ of the test.

Fig. 7. The same view of a larger specimen, showing stronger undulations of the tube, with several septa near the apex.

Fig. 8. The umbilical side of an example, showing the rapidly enlarging tube and the broad, shallow umbilicus. Schoharie grit. *Schoharie, N. Y.*

Trochoceras eugenium.

Page 396.

See Plate 58.

Fig. 10. A view of the upper lateral side of an individual, preserving the grand chamber and a part of the septate portion, the whole forming a little more than an entire volution, and showing the outer half of the grand chamber produced beyond the inner volution, in a straight line, and not following the curvature of the spiral axis.

Fig. 11. A similar view of a larger individual, showing the gibbous form of the shell and the contraction of the tube toward the aperture. Schoharie grit. *Schoharie, N. Y.*

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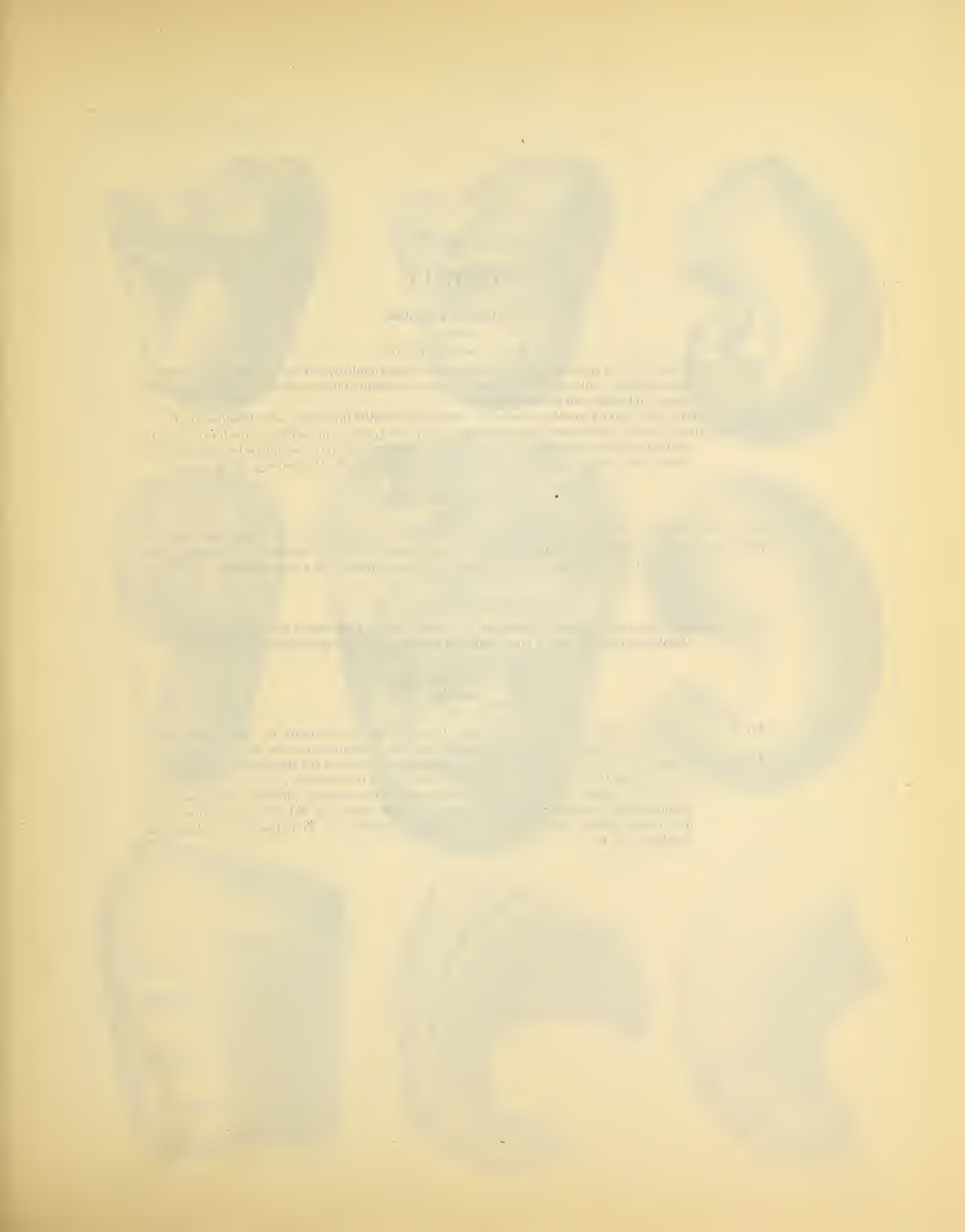
PLATE LX.

Nautilus bucinum.

Page 412.

See Plates 106, 107, 109.

Fig. 1. The dorsal side of a specimen which preserves the inner volutions, and shows the wide aperture.

Fig. 2. The same specimen, with the inner volution removed, showing the form of transverse section, position of siphuncle, and surface-markings.

Fig. 3. A lateral view of the preceding specimen. From the Goniatite limestone, near *Manlius, N. Y.*

Fig. 4. A dorsal view of a larger individual, showing the form of aperture and section of the inner volutions. Several of the air-chambers are broken away, and the position of the siphuncle is shown on the convex and concave surfaces of the septa. Near *Solsville, Madison county, N. Y.*

Nautilus cornulum.

Page 414.

Fig. 5. A ventral view of the specimen, showing the more circular form of section and of the aperture.

Fig. 6. A lateral view of the preceding specimen, showing the suture lines of the chambered portion of the shell, and the undulating striæ of growth over the surface of the grand chamber. Near *Cazenovia, N. Y.*

Gomphoceras ——— sp.

Fig. 7. A lateral view of a fragment, showing a moderate degree of curvature and preserving eight air-chambers, with the base of the chamber of habitation. *Shore of Skaneateles lake, N. Y.*

Nautilus liratus.

Page 407.

See Plate 57.

Fig. 8. A figure of a gutta-percha impression, from the mould left in the matrix by the specimen fig. 9, showing the strong revolving plications and the obscure annulations near the apex.

Fig. 9. A specimen preserving the greater part of the chambered portion of the shell in its natural proportions. Several low, transverse undulations are shown toward the apex, and the septal lines are visible beneath the partially exfoliated shell. The revolving plications, which are very prominent near the apex, and are continuous on the concave dorsal side, become obsolete on the ventral side as they approach the chamber of habitation. From the Goniatite limestone. *Scoharie, N. Y.*

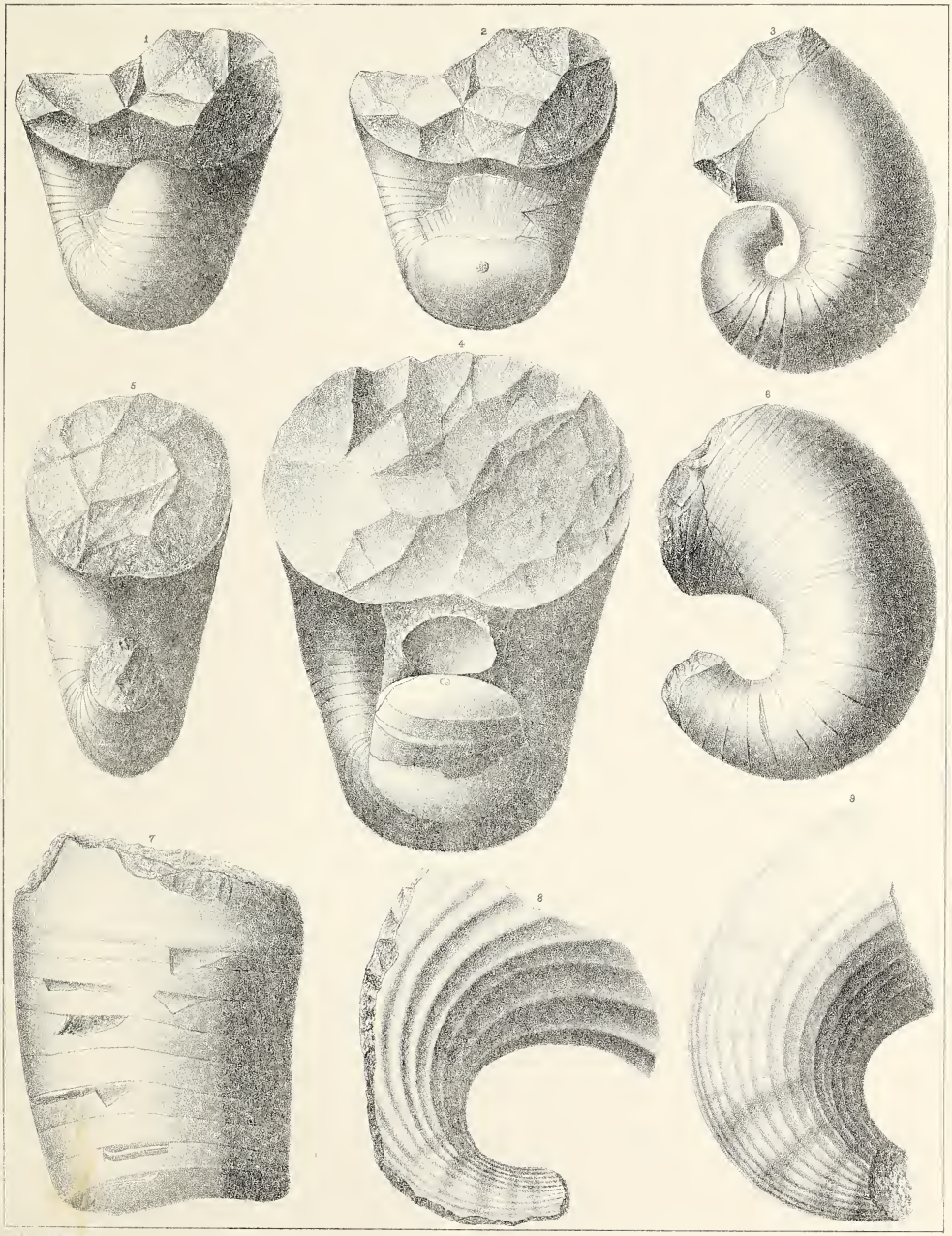
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PLATE LXI.

NAUTILUS ORIENS.

Page 420.

See Plates 105, 106.

Fig. 1. Lateral view of a compressed, somewhat imperfect cast, preserving evidence of the revolving striæ on some parts of the surface. From the Marcellus shale, near *Richmondville, Schoharie county, N. Y.*

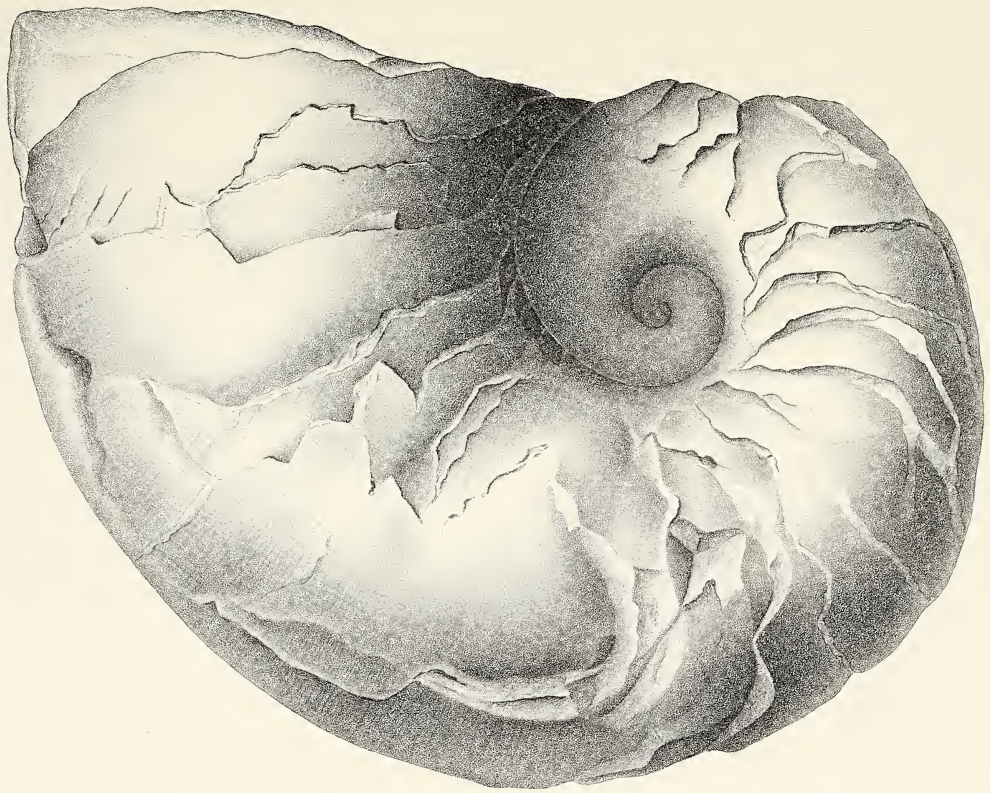

PLATE LXII.

NAUTILUS MAGISTER.

Page 422.

See Plates 105, 107, 108.

Fig. 1. Lateral view of a large rotund specimen, preserving the inner volutions and a large part of the grand chamber. The septa are replaced with crystalline matter and are very much broken at the margins. From the Hamilton group on the shore of Lake Erie. *Hamburgh, Erie county, N. Y.*

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PLATE LXIII.

NAUTILUS MAXIMUS.

Page 418.

See Plate 64.

A lateral view of a large individual of the species, showing more than two volutions, and preserving the grand chamber nearly entire.

This specimen is from the locality of the original of Mr. CONRAD'S species, *Cyrtoceras maximum*, and was lithographed nuder his direction. *Solsville, Madison county, N. Y.*

(CEPHALOPODA.)

SWINTON DEL. ET LITH.

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PLATE LXIV.

NAUTILUS MAXIMUS.

Page 418.

See Plate 63.

A lateral view of a large individual of the species.

Palæontology of N.Y.Vol.V.Pt.II

G.B.Simpson del.

Plate LXIV.

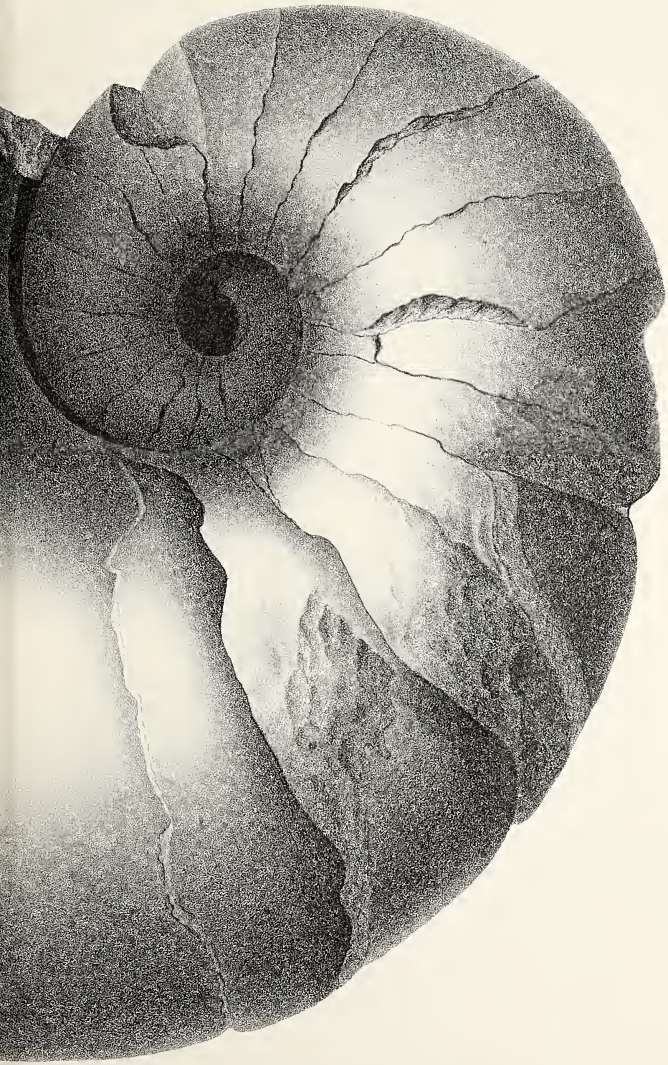

PLATE LXV.

NAUTILUS (DISCITES) MARCELLENSIS.

Page 428.

See Plate 109.

Fig. 1. A lateral view of an internal cast of a large individual of the species, showing the air-chambers, the anterior extension of the septa on the peripheral angles, and some irregularity in the distribution of the nodes. The grand chamber is nearly entire.

Fig. 2. A cast of the interior preserving the grand chamber nearly entire, with a single volution of the septate portion of the shell. The chambers of the inner volution are slightly deeper than in the preceding specimen, and the chamber of habitation is more rapidly expanding. The nodes on the peripheral angles are not so strong as in the specimen fig. 1. Both specimens are from the Goniatite limestone of the Marcellus shale. Near *Manlius, N. Y.*

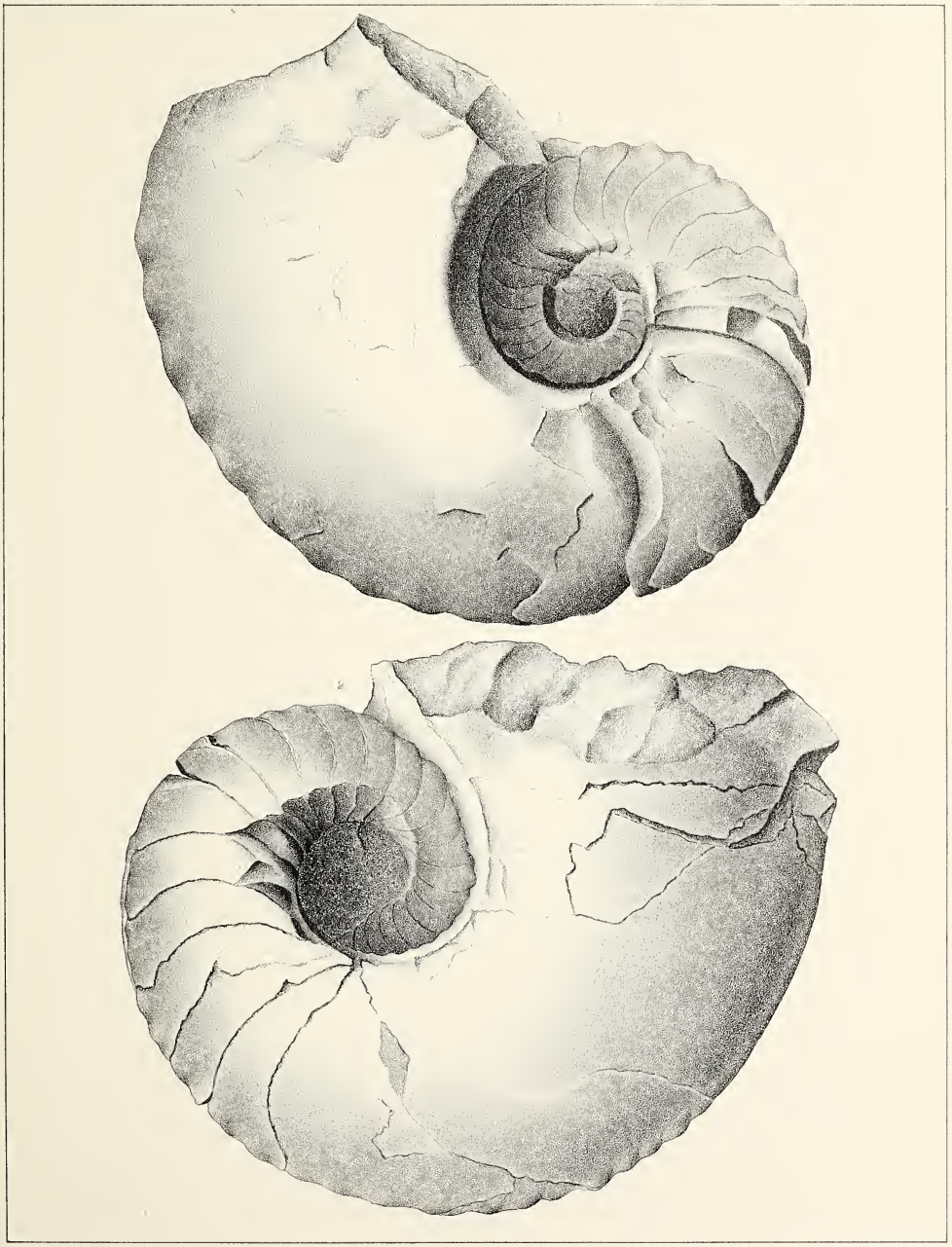

PLATE LXVI.

GONIATITES VANUXEMI.

Page 434.

See Plates 67, 68, 69, 109.

Fig. 1. Lateral view of a specimen of medium size, retaining the test on the outer chamber, and showing the septa on the remainder of the outer volution. The direction of the striæ and the margin of the aperture is also shown, together with a larger umbilicus than is usual in the specimens of this species. Goniatite limestone. *Manlius, N. Y.*

Fig. 2. Profile of another individual, showing the thickness of the disc, the flattening of the periphery, the sinus of the striæ, and the acute ventral lobe of the septa Goniatite limestone. *Manlius, N. Y.*

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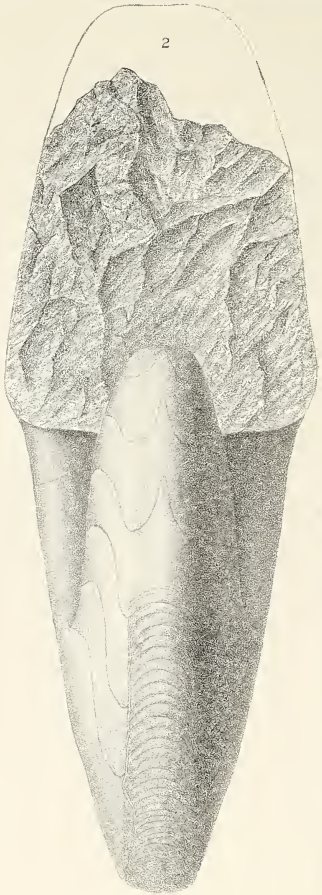
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PLATE LXVII.

GONIATITES VANUXEMI.

Page 434.

See Plates 66, 68, 69, 109.

Fig. 1. Lateral view of a large individual, retaining the inner septate portions and a large part of the chamber of habitation, on which the test and surface-markings are preserved. Goniatite limestone. *Manlius, N. Y.*

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PLATE LXVIII.

GONIATITES VANUXEMI.

Page 434.

See Plates 66, 67, 69, 109.

Fig. 1. Lateral view of the largest individual of the species known, showing the comparative size of the chamber of habitation and a contraction of the tube near the aperture. The specimen has been denuded of the test, and the filling of the outer chamber much broken. The lines of septa are well shown on a part of the volutions, and on the inner ones the test is partially preserved, but without surface-markings. Goniatite limestone. Near *Manlius, N. Y.*

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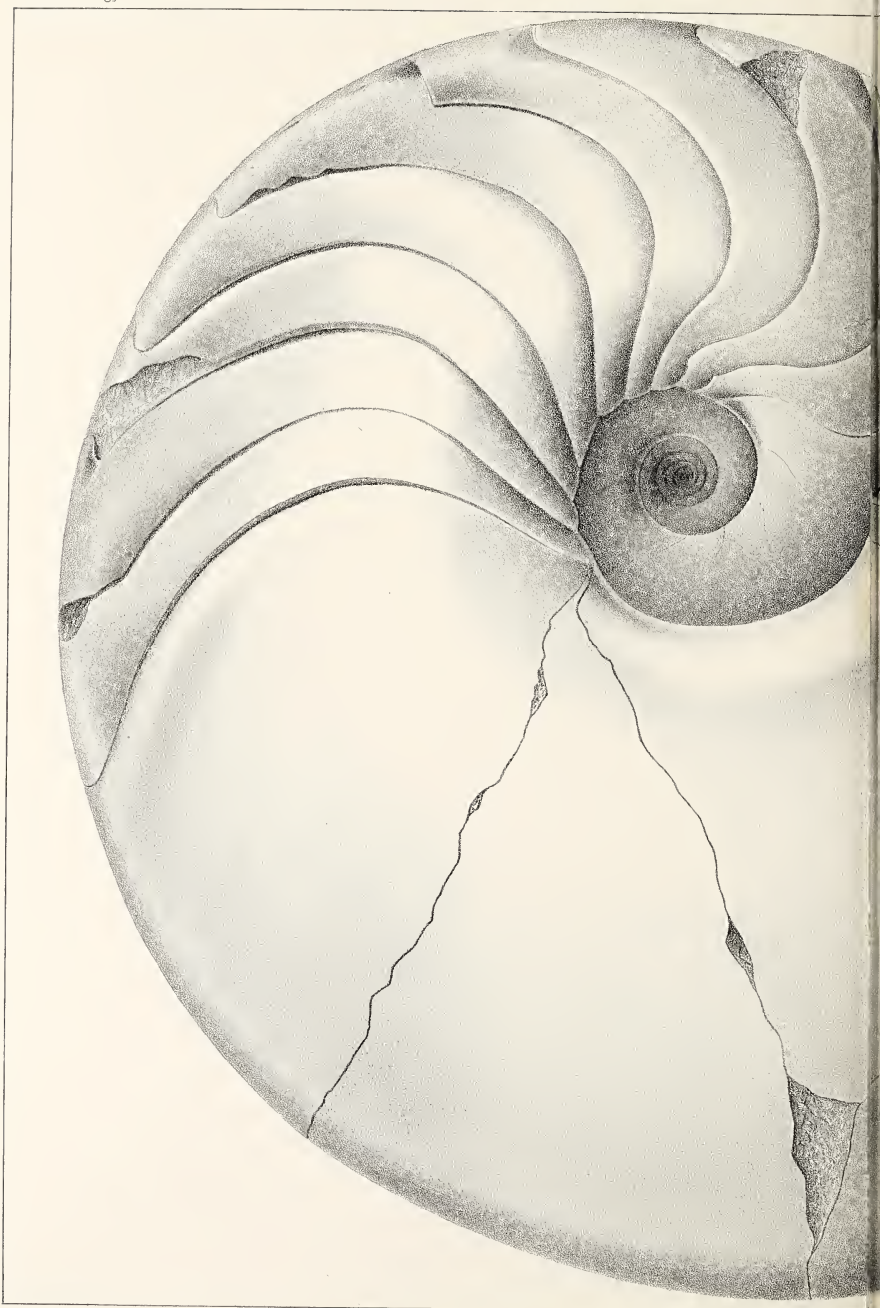
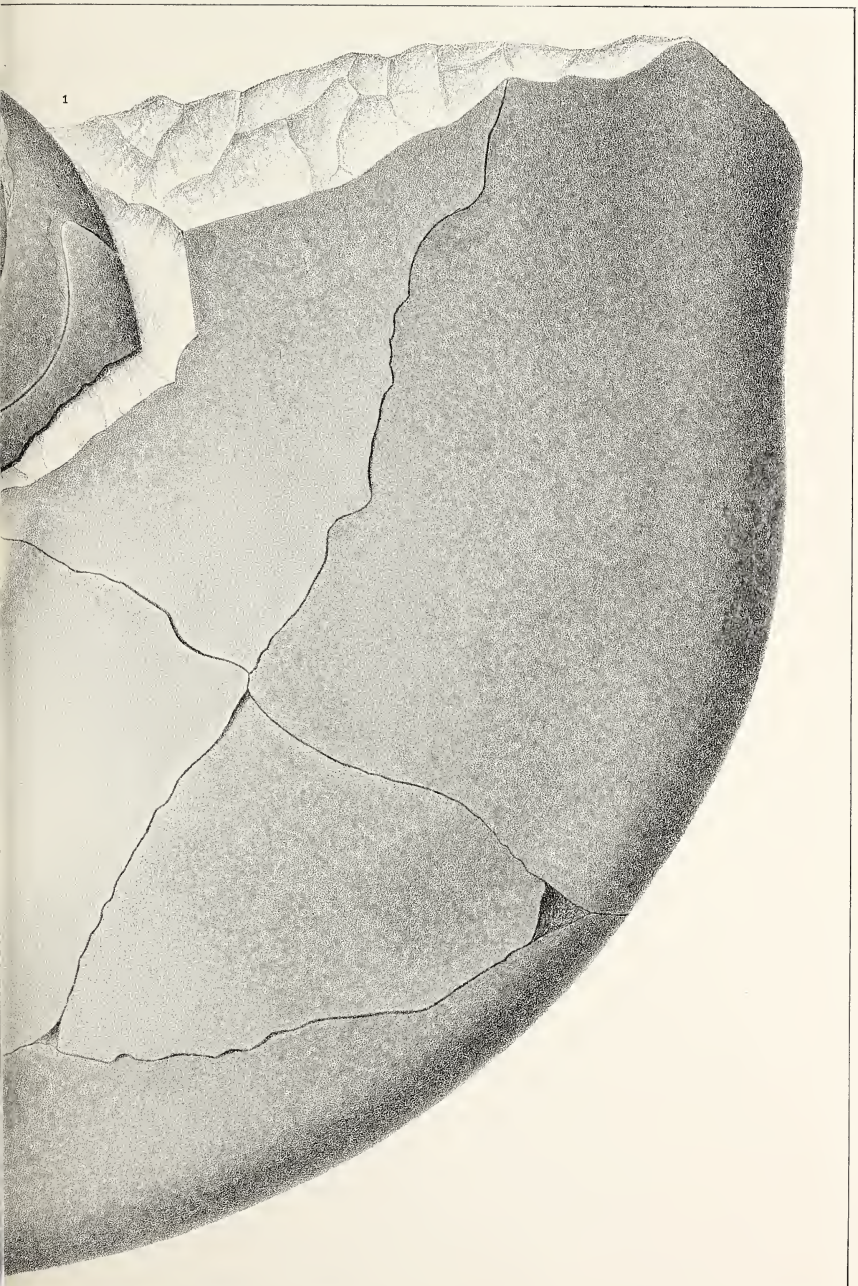


G.B.Simpson del

Plate LXVIII.



P. Riemann lith.

G B Simpson del

P.Riemann lith.

PLATE LXIX.

Goniatites simulator.

Page 463.

See Plate 74.

Fig. 1. Lateral view of a specimen showing a considerable part of the grand chamber, with the remaining portion distinctly marked by the septal lines. Chemung group. Near *Ithaca, N. Y.*

Fig. 2. Profile of the same, showing the course of the septa and minute ventral lobe. The specimen is somewhat imperfect, and the outline of the aperture on the right side of the figure has been restored to correspond with the preserved portion on the left side. The basal margins of the aperture are more angular than represented.

Goniatites Vanuxemi.

Page 434.

See Plates 66, 67, 68, 109.

Fig. 3. Lateral view of a young specimen which is septate throughout (the outer chamber wanting), and the volutions very rotund.

Fig. 4. The peripheral side of the same individual, showing the ventral lobe and the double revolving furrows, which mark this stage of growth.

Fig. 5. Lateral view of a larger specimen, showing the revolving grooves and transverse undulations, both of which usually become obsolete in the more advanced stages of growth.

Fig. 6. Lateral view of a larger individual, showing the gradual obsolescence of the external features which mark the younger stages of growth. The specimens of this species, here illustrated, are from the Goniatite limestone of the Marcellus shales. Near *Manlius, N. Y.*

Goniatites Mithrax.

Page 423.

See Plate 74.

Fig. 7. Lateral view of the specimen originally described, showing the form and disposition of the septa. Upper Helderberg limestone. Near *Columbus, Ohio.*

Goniatites peracutus.

Page 463.

See Plate 74.

Fig. 8. Lateral view of a fragment preserving the base of the grand chamber and several adjacent air-chambers. From the base of the Chemung group. Near *Ithaca, N. Y.*

Goniatites Chemungensis.

Page 467.

See Plate 74.

Fig. 9. View of the original of Mr. Vanuxem's figure. The specimen shows parts of several of the inner volutions and the impression of others, with a portion of the principal one. Chemung group. Near *Oxego, N. Y.*

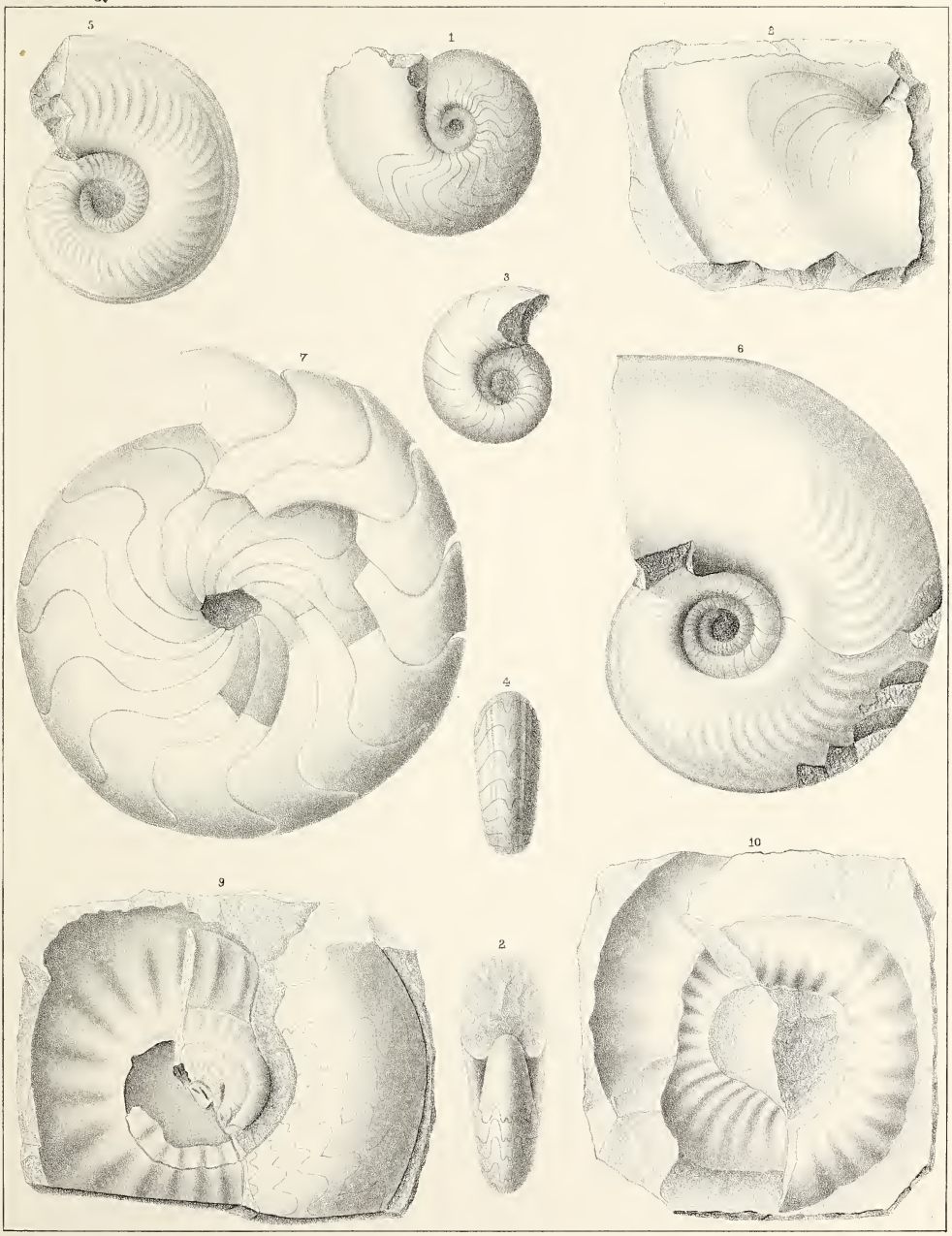
Goniatites Chemungensis, var. equicostatus.

Page 469.

Fig. 10. Lateral view of a specimen which is very imperfectly preserved, but showing the annulations of the tube.

(GONIATITIDÆ.)

Palæontology N.Y. Vol. IV, Pt II. Plate LXIX



H.M. Martin del. P. Riemann lith.

PLATE LXX.

Euomphalus (Straparollus) clymenioides.

Page 62.

See Plates 16, 27.

Fig. 1. The umbilical side of an imperfect specimen preserving about two and a half volutions.

Fig. 2. The opposite side of another individual preserving a single volution, the apical end showing a septum of decollation.

Fig. 3. Another specimen, the extremity of which shows a similar condition of decollation.

Fig. 4. A large specimen preserving about two and a half volutions.

Fig. 5. A small individual preserving the inner volutions entire.

The above are from the Schoharie grit. *Albany and Schoharie counties, N. Y.*

Goniatites complanatus.

Page 455.

Fig. 6. Lateral view of a specimen of ordinary size, very much compressed. From the Hamilton group, just below the Genesee slate. *Full creek, Geneseo, N. Y.*

Fig. 7. Lateral view of a slightly larger, compressed specimen, showing very faintly the surface striæ. *Moscow, N. Y.*

Fig. 8. Lateral view of a specimen preserving the septa. Near *Geneseo, N. Y.*

Fig. 9. Lateral view of another individual, doubtfully referred to this species.

Fig. 10. An extremely compressed specimen, leaving scarcely more than an impression of the form with some of the surface-markings. Portage group. *Eighteen-mile creek, Lake Erie shore, N. Y.*

Fig. 11. An extremely compressed individual which has been in part replaced by iron pyrites. From the Portage group. *Cashaqua creek, Livingston county, N. Y.*

Goniatites complanatus, var. perlatus.

Page 458.

Fig. 12. A large individual, probably a variety of the preceding species. Lower Chemung group. Near *Homer, N. Y.*

Goniatites sinuosus.

Page 460.

See Plates 72, 74.

Fig. 13. Internal mould of a small specimen showing the form slightly distorted, with numerous lines of septa preserved. Lower Chemung group, at the inclined plane of railroad, *Ithaca, N. Y.*

Fig. 14. A fragment of stone containing a segment of the outer volution and impressions of several of the inner volutions, showing the surface striæ and septa. Ithaca beds of the Chemung group. Near *Truxton, N. Y.*

Fig. 15. Lateral view of a large compressed specimen, showing the general form and a few of the septa. From the same beds as the above, at the railroad inclined plane, near *Ithaca, N. Y.*

(GONIATITIDÆ.)

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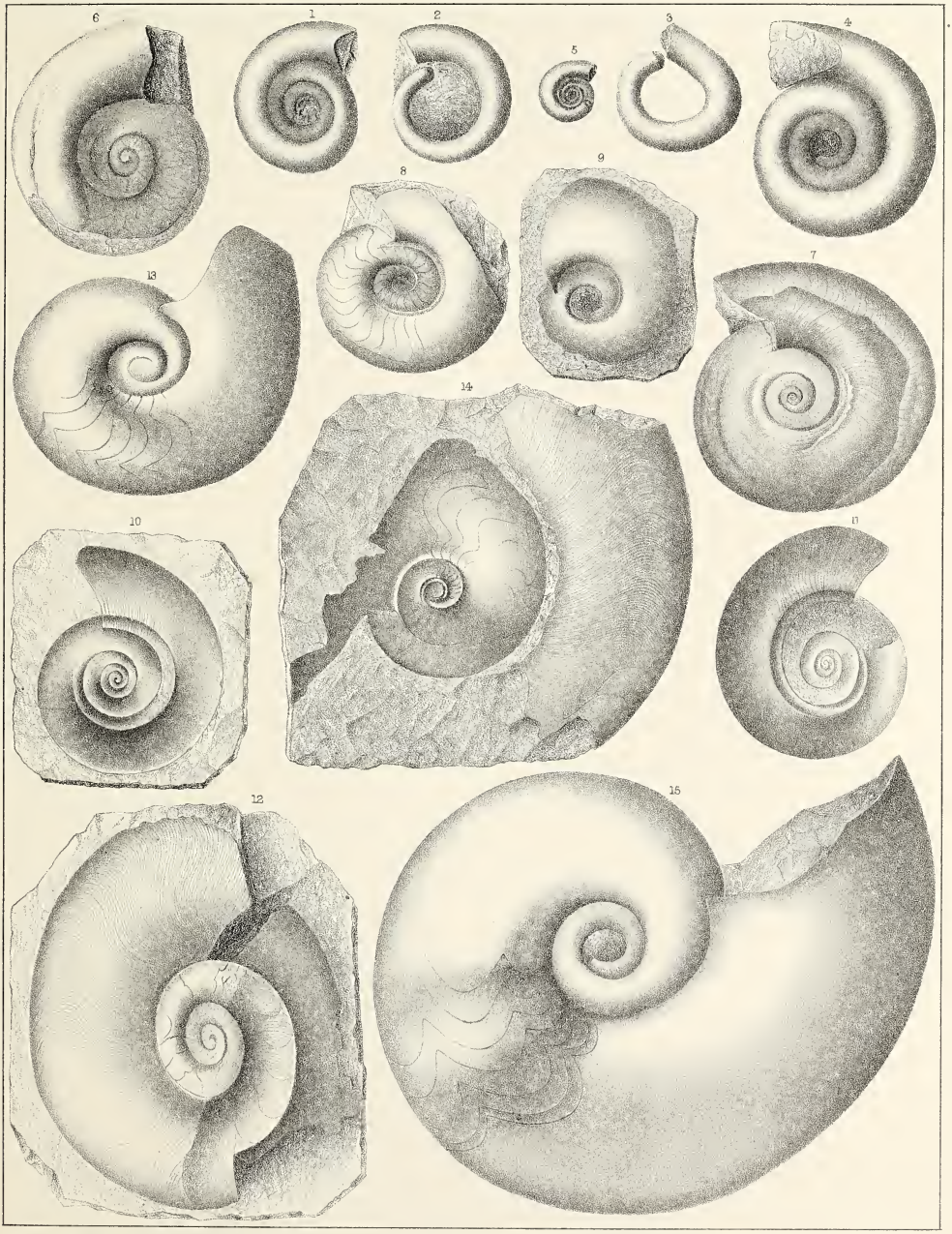
Plate LXX.



H.M.Martin del.

P.Riemann lith.

PLATE LXXI.

Goniatites discoideus.

Page 441.

See Plate 74.

Fig. 1. An imperfectly preserved specimen. Tully limestone. *Smith's ledge, Otisco, N Y.*

Figs. 2, 3. Compressed specimens retaining the test. From the Marcellus shales, at *Schoharie, N. Y.*

Fig. 4. A small individual retaining its original form. Goniatite limestone. Near *Manlius, N. Y.*

Figs. 5, 6. Two views of another similar specimen. Goniatite limestone. Near *Manlius, N. Y.*

Fig. 7. A larger and slightly compressed specimen, showing surface-markings and a few imperfect septal lines in the smaller part of the volution. Hamilton group. Near *Cazenovia, N. Y.*

Figs. 8, 9. Two views of a medium-sized, rotund specimen, showing septal lines, and retaining the test over a part of the outer chamber. Goniatite limestone. Near *Manlius, N. Y.*

Fig. 10. A large individual, showing imperfectly a few of the suture-lines and the margin of the aperture. Hamilton shales. Near *Cayuga lake, N. Y.*

Fig. 11. An imperfect specimen showing the usual form, and obscurely the septa of this species. Portage group. *Portland Harbor, N. Y.*

Fig. 12. An individual showing several air-chambers and obscure lines of growth. Hamilton shales. *Western New York.*

Fig. 13. The internal mould of a less compressed specimen showing several air-chambers. Hamilton group. *Cazenovia, N. Y.*

Goniatites uniangularis.

Page 444.

See Plates 72, 74.

Fig. 14. Lateral view of the original of Mr. Conrad's description, showing the general form and air-chambers. Hamilton group. Near *Moscow, N. Y.*

Goniatites unilobatus.

Page 438.

Fig. 15. Lateral view of a small specimen showing the umbilicus, septal lines, and in part the flattened periphery.

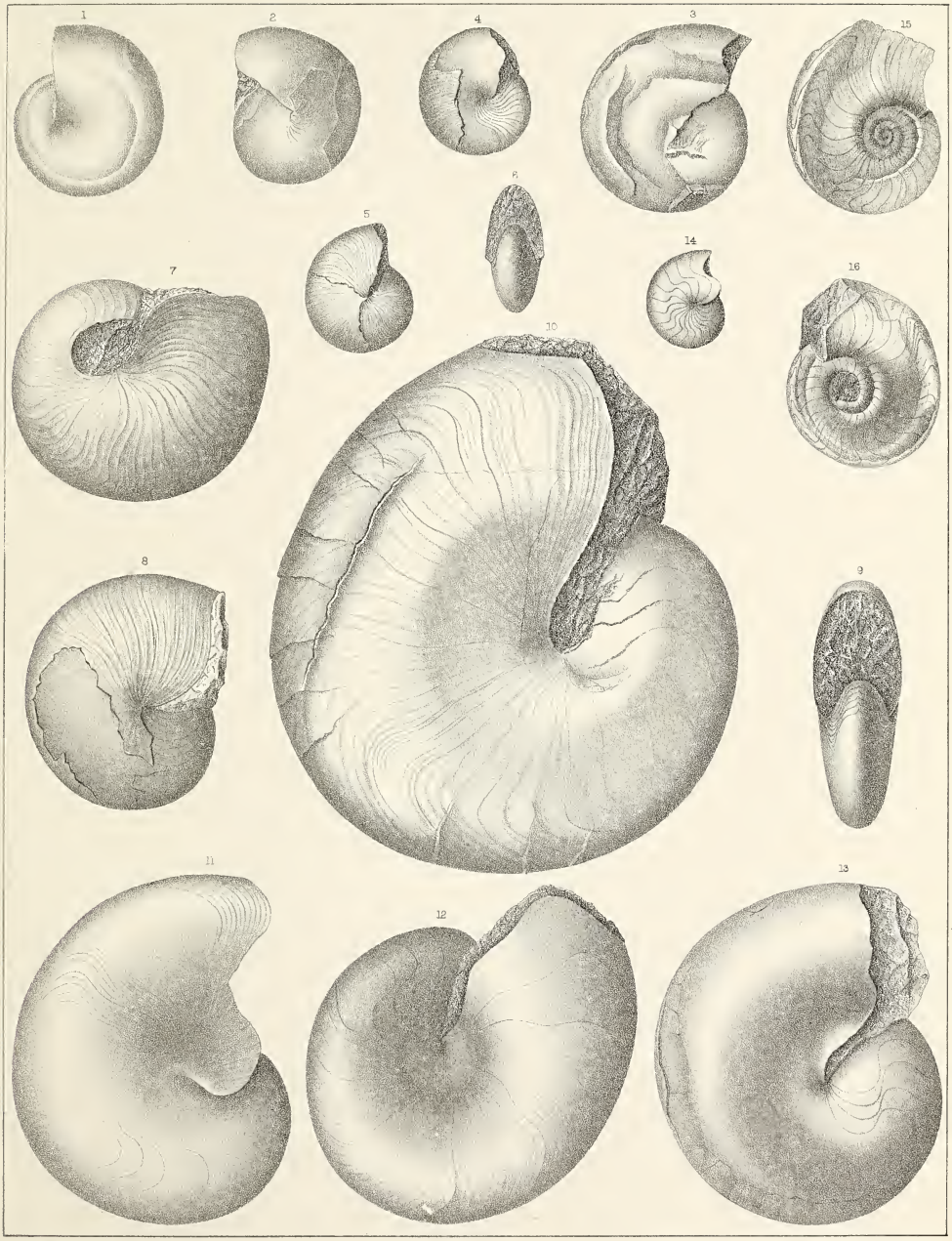
Fig. 16. The opposite side of the same specimen. Hamilton group. *Norton's landing, Cayuga lake, N. Y.*

HAMILTON GROUP.

(GONIATITIDÆ.)

Palæontology N.Y. Vol IV. Pt. II.

Plate LXXI.



H. M. Martin. del.

P. Riemann lith.

PLATE LXXII.

Goniatites Patersoni.

Page 464.

See Plate 74.

Figs. 1, 2. Profile and lateral views of a small specimen, showing the lines of septa, and retaining a portion of the outer chamber. From the Portage group. Near *Gibsonville, N. Y.*

Fig. 3. Segment of a much larger specimen. Portage group, at *Paterson's creek, Livingston county, N. Y.*

Fig. 4. A segment of a very large specimen, in which the septal margins are much thickened. Chemung group. *Pine Valley, town of Catharine, Schuyler county, N. Y.*

Fig. 5. A large specimen preserving only two septal lines, neither of which are quite perfect. From the Portage group, above the Lower Falls, at *Portageville, N. Y.*

Goniatites uniangularis.

Page 444.

See Plates 71, 74.

Figs. 6, 7. Lateral and profile views of a large individual, showing septal lines, and retaining portions of the exfoliated test. Portage group.

Goniatites bicostatus.

Page 450.

See Plate 74.

Fig. 8. Lateral view of an individual, showing suture-lines over a part of the surface, and also the depressed, revolving band on the side. Portage group. *Genesee river, N. Y.*

Fig. 9. Lateral view of a small specimen twice enlarged, preserving the test, showing surface striæ and the revolving carina. Portage group. *Chautauqua county, N. Y.*

Fig. 10. A small, imperfect individual enlarged three diameters, differing somewhat from the last in surface-characters, and having very deep air-chambers. Portage group. *Lake Erie shore.*

Goniatites sinuosus.

Page 460.

Fig. 11. A fragment originally referred to this species in the *Report of the Fourth District of N. Y.* The specimen is from the Portage group, at *Cashaqua creek, Livingston county, N. Y*

Goniatites Lyoni.

Page 476.

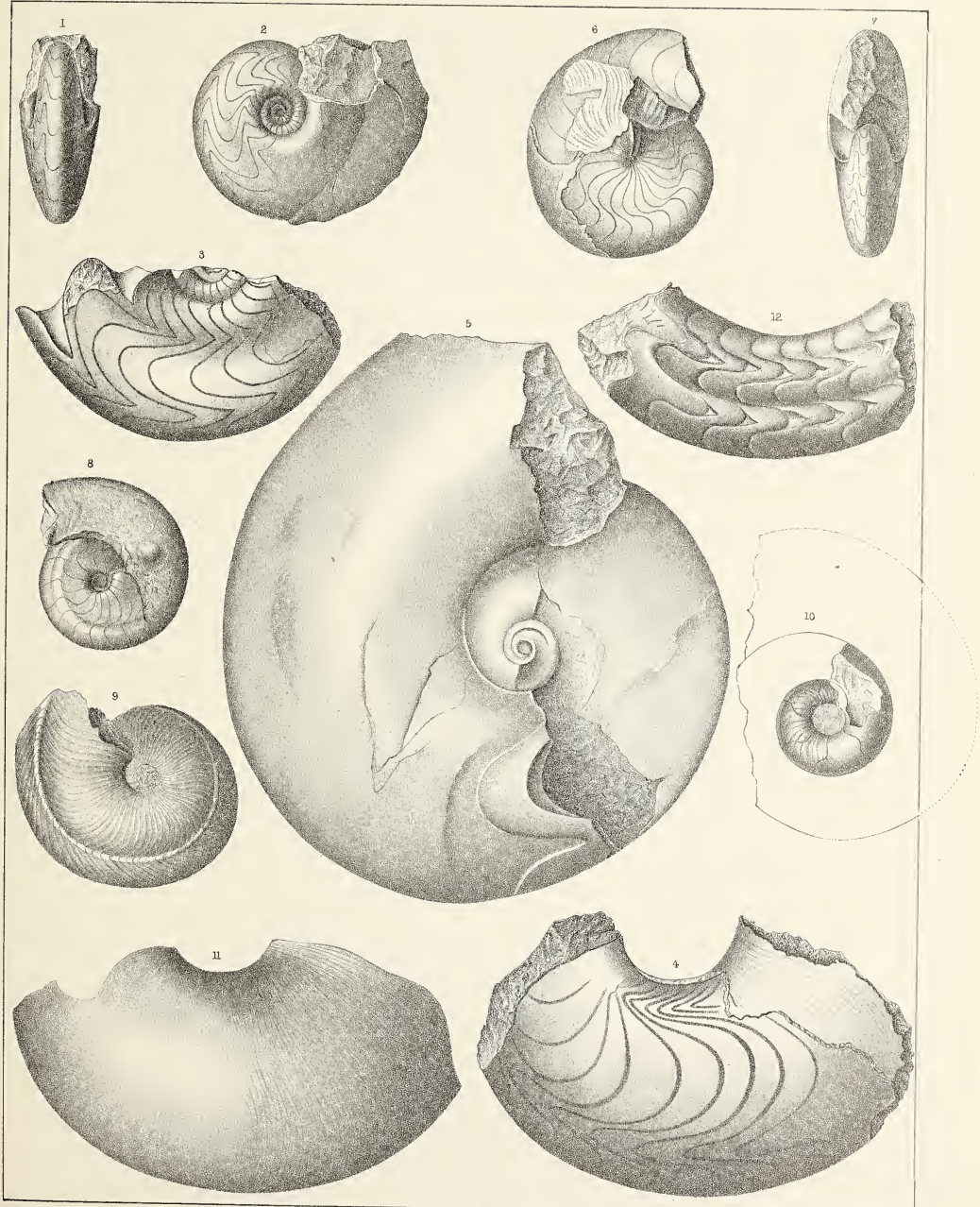
See Plates 73, 74.

Fig. 12. A segment of a large individual of this species, showing the margins of the septa and the mucronate extensions of the lobes. Goniatite limestone. *Rockford, Indiana.*

(GONIATITIDÆ.)

Palæontology N.Y.Vol.V.Pt II.

Plate LXXII.



H.M.Marum del.

P.Riemann lith.

PLATE LXXIII.

Goniatites Oweni, var. parallela.

Page 473.

See Plate 74.

Fig. 1. Lateral view of a specimen, showing the directions of the sutures and the size of the umbilicus.

Fig. 2. Ventral view of the same individual, showing the approximation of the septal lines on each side of the ventrum, forming two parallel grooves in the cast. Goniatite limestone. *Rockford, Ind.*

Goniatites Oweni.

Page 470.

See Plate 74.

Fig. 3. Lateral view of a specimen of medium size, showing the directions of the sutures and the wide umbilicus.

Fig. 4. Ventral view of the same, showing features contrasting with those of fig. 2.

Figs. 5, 6. Lateral views of two young individuals. It is possible that fig. 5 may be the young of the variety, but it is difficult to determine from such immature examples.

Figs. 7, 8. Two larger individuals preserving no traces of septa, and showing the constriction of the tube at irregular intervals. Goniatite limestone. *Rockford, Indiana.*

Goniatites Lyoni.

Page 476.

See Plates 72, 74.

Fig. 9. Lateral view of an imperfect specimen restored in part, and showing the gradually enlarging volutions and the sinuosities of the septal margins.

Fig. 10. A portion of a larger individual preserving the base of the outer chamber. The lobes and saddles of the septa are very imperfectly represented in the two preceding figures. The specimens show the apex of each lobe to be tipped with a small mucronate extension.

Fig. 11. Ventral view of a fragment, showing the deep acute lobe of the septa on the ventrum. Goniatite limestone. *Rockford, Indiana.*

Goniatites Ixion.

Page 474.

See Plate 74.

Fig. 12. Lateral view of a young individual, showing a more rotund form than in the larger specimens.

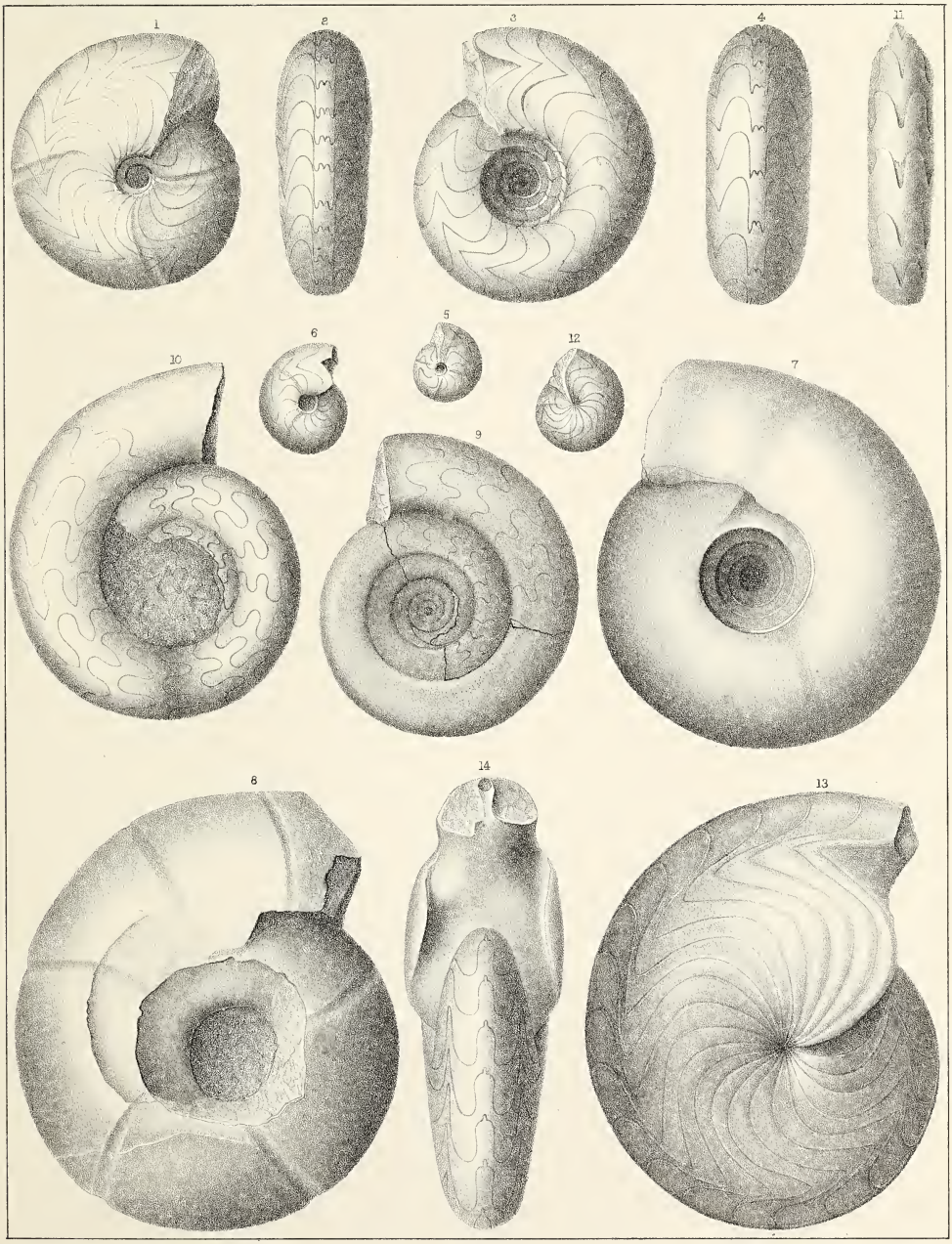
Fig. 13. Lateral view of a large individual, showing septal lines throughout, and the very small umbilical depression.

Fig. 14. Front profile view of the same individual, showing the form of the transverse section, the size of the siphuncle, and the mucronate extension of the ventral lobe. Goniatite limestone. *Rockford, Indiana.*

GONIATITE LIMESTONE.

of Rockford, Indiana.

(GONIATITIDÆ.)



H.M. Martin del.

P. Huemann lith.

PLATE LXXIV.

Fig. 1. Development of a septum of Goniatites bicostatus, Hall. From the specimen fig. 8 on plate 72.
Fig. 2. Development of a septum of G. uniangularis, Conrad. From the specimen fig. 14 on plate 71.
Fig. 3. Development of a septum of G. discoideus, Hall. From a young individual, represented on plate 71, fig. 4.
Fig. 4. Development of a septum of an adult specimen of G. discoideus, Hall. Plate 71, fig. 13.
Fig. 5. Development of a septum of G. unilobatus, Hall. Plate 71, fig. 15.
Fig. 6. Development of a septum of G. Chemungensis, Vanuxem. Plate 69, fig. 9.
Fig. 7. Development of a septum of G. Lyoni, Meek and Worthen. Plate 73, fig. 10.
Fig. 8. Development of a septum of G. simulator, Hall. Plate 69, fig. 1.
Fig. 9. Development of a septum of G. Oweni, Hall. Plate 73, fig. 3.
Fig. 10. Development of a septum of G. Oweni, var. parallela, Hall. Plate 73, fig. 1.
Fig. 11. Development of the left side of a septum of G. sinuosus, Hall. Plate 70, fig. 15.
Fig. 12. Development of the right side of a septum of G. Ixion, Hall. Plate 73, fig, 13.
Fig. 13. Development of a septum of G. peracutus, Hall. Plate 69, fig. 8.
Fig. 14. Development of a septum of G. Mithrax, Hall. Plate 69, fig. 7.
Fig. 15. Development of a septum of G. Patersoni, Hall. Plate 72, fig. 3.

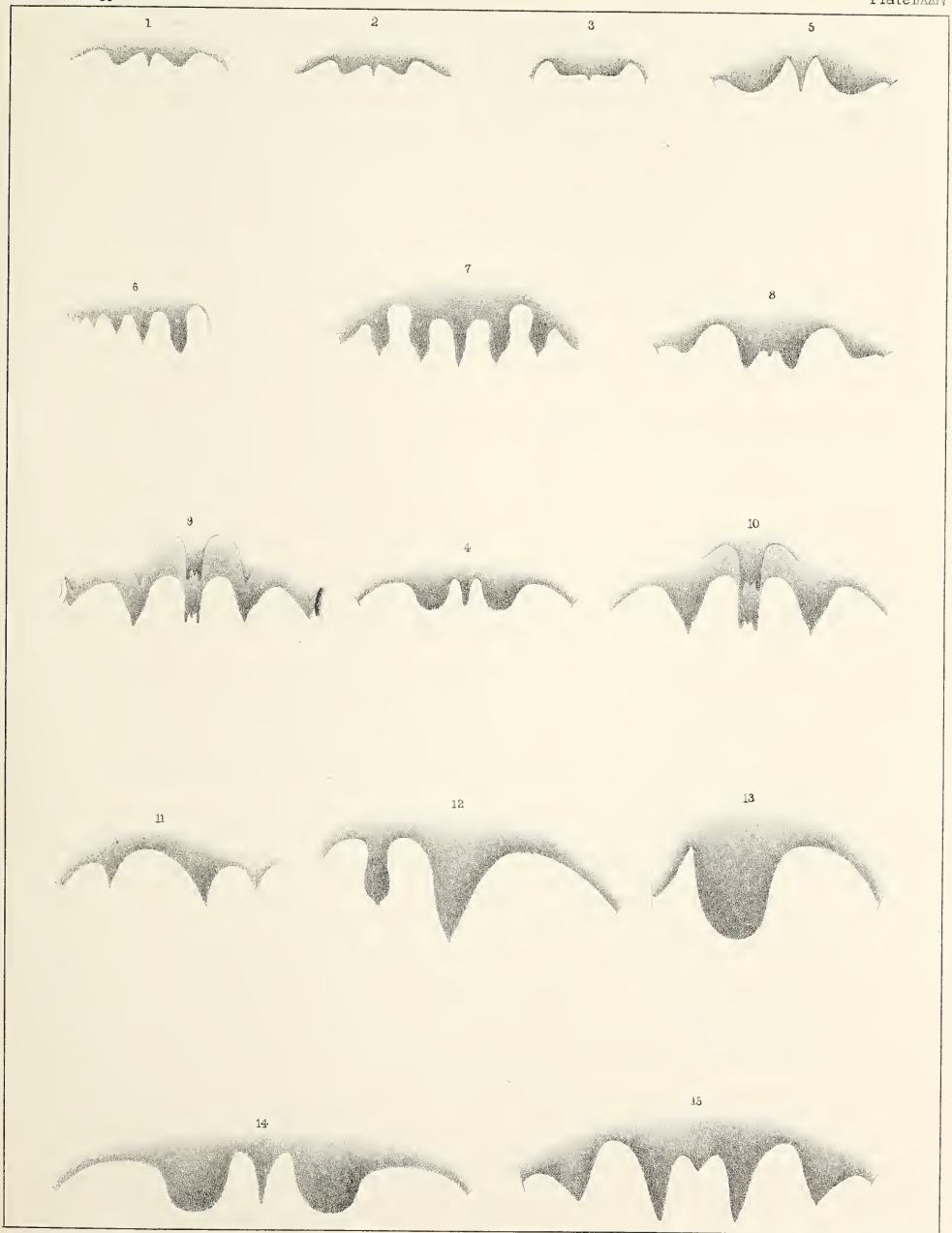

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PLATE LXXV.

Orthoceras Zeus.

Page 235.

Fig. 1. An individual showing eight chambers, and a large portion of the chamber of habitation, with a broad, shallow constriction near the aperture. *Helderberg mountains, N. Y.*

Fig. 2. Longitudinal section of another specimen, showing the depth of the chambers and the concavity of the septa. The position of the siphuncle is indicated by slight indentures in the septa.

Fig. 3. A septum from specimen, fig. 1, showing the size and position of the siphuncle.

Fig. 4. A septum of Cyrtoceras, showing position and size of siphuncle. See plate 95.

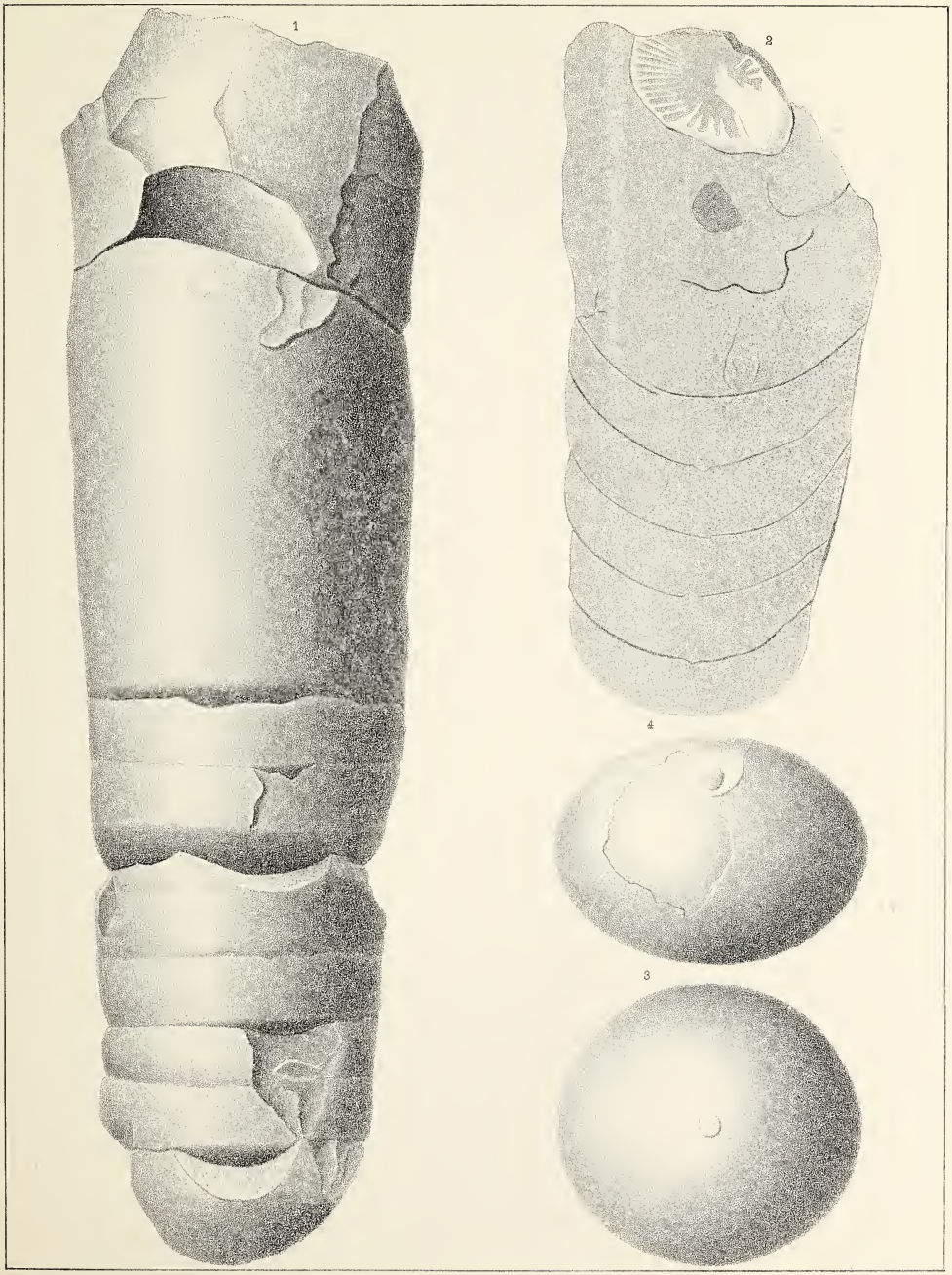
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PLATE LXXVI.

Orthoceras luxum.

Page 244.

See Plates 35, 77, 78, 78 B, 81, 112.

Fig. 1. A small septate fragment possessing the usual characters of the species. The specimen shows a longitudinal raised line along the chambers, indicating the position of the ventral side, not represented in the figure. *Clarksville, N. Y.*

Orthoceras cingulum.

Page 240.

Fig. 2. Fragment of the largest individual observed, ventral side, showing the regular horizontal margins of the septa, and the banded or zoned appearance, caused by the solution of the produced septal margins. A longitudinal raised line on the specimen is not represented in the figure. *Schoharie, N. Y.*

Fig. 3. Dorsal view of a smaller individual. The specimen is much flattened and weathered on the dorsal side. The ventral side presents all the distinguishing characters of figure 2. *Schoharie, N. Y.*

Orthoceras fluctum.

Page 239.

Fig. 4. A specimen preserving a portion of the chamber of habitation, and fifteen chambers.

Fig. 5. A fragment preserving a portion of the chamber of habitation, with twelve of the chambers. The lower portion, consisting of seven chambers, is of *O. luxum*, and has been artificially attached to the original specimen, escaping observation till the plate had been completed.

Fig. 6. Longitudinal section of specimen, fig. 5, showing the depth of the chambers, and convexity of the septa. No traces of the siphuncle are preserved.

Fig. 7. A septum from specimen, fig. 4, showing the position of the siphuncle. A small areola around the siphon is not represented.

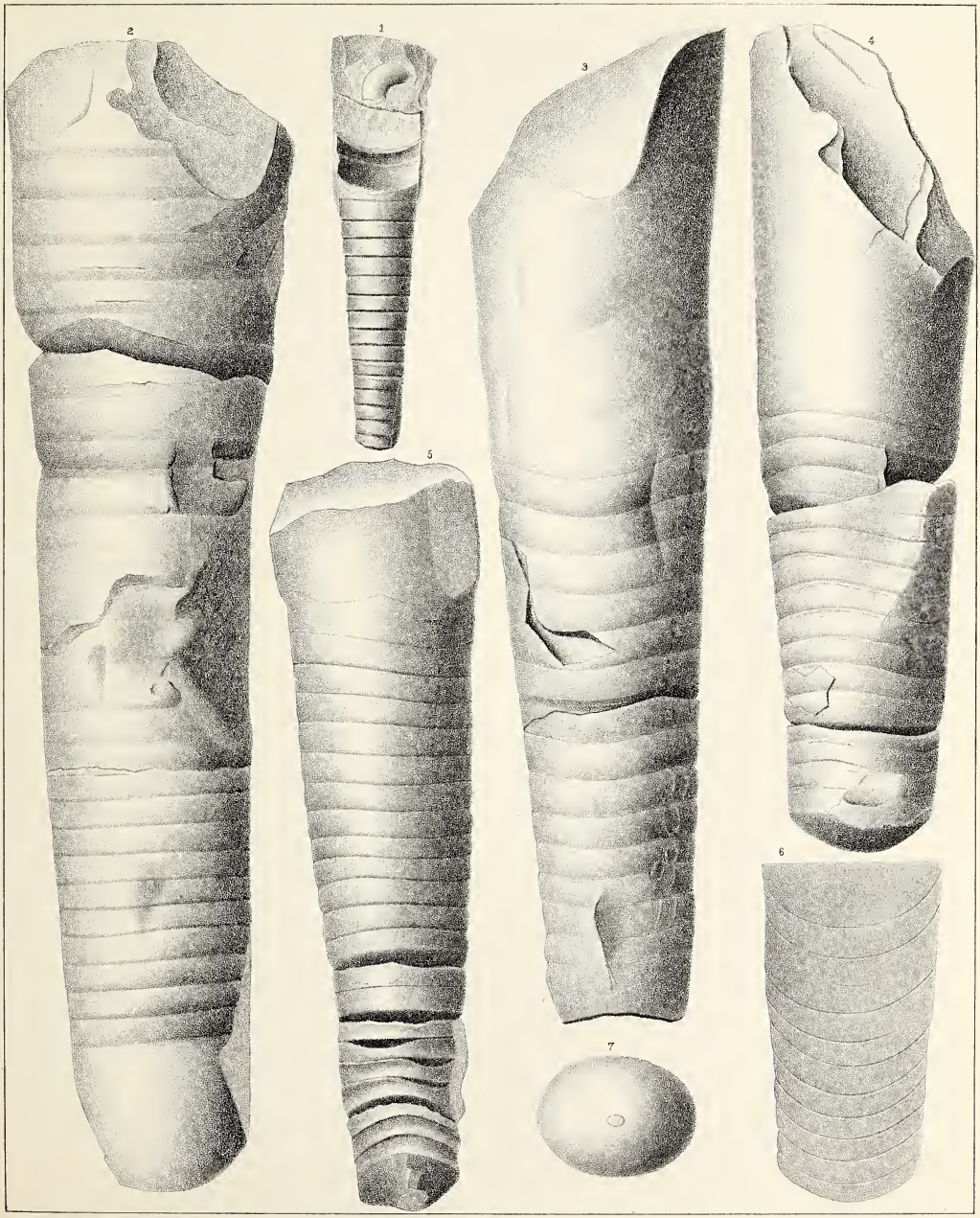
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PLATE LXXVII.

Orthoceras luxum.

Page 244.

See Plates 35, 76, 78, 78 B, 81, 112.

Fig. 1. An individual of this species, preserving a large portion of the chamber of habitation, and twenty-three of the ordinary chambers. *Schoharie, N. Y.*

Fig. 2. A small individual showing the concave walls of the chambers in the lower part of the figure. The organic deposit is not represented. *Schoharie, N. Y.*

Fig. 3. Ventral view of a specimen with the apical portion much compressed. The organic deposit indicating the ventral side is not shown in the figure. *Clarksville, N. Y.*

Fig. 4. Fragment showing the siphuncle exposed by weathering, and the longitudinal plications extending along the separate beads. *Schoharie, N. Y.*

Fig. 5. A septate fragment showing the walls of the chambers broken away, except a few of the upper ones, and the organic deposit nearly filling the interseptal spaces. This feature is more satisfactorily shown in another specimen, represented in figure 13, plate 81. *Schoharie, N. Y.*

Fig. 6. Ventral side of the apical portion of an individual, retaining much of its normal form. The longitudinal carina on the ventrum is not represented.

Fig. 7. Lateral view of a specimen, showing the dislocation and obliquity of the chambers caused by compression.

Fig. 8. Longitudinal section, showing the convexity of the septa and the depth of the chambers. The elements of the siphuncle are more fully represented in figure 3, plate 78 B.

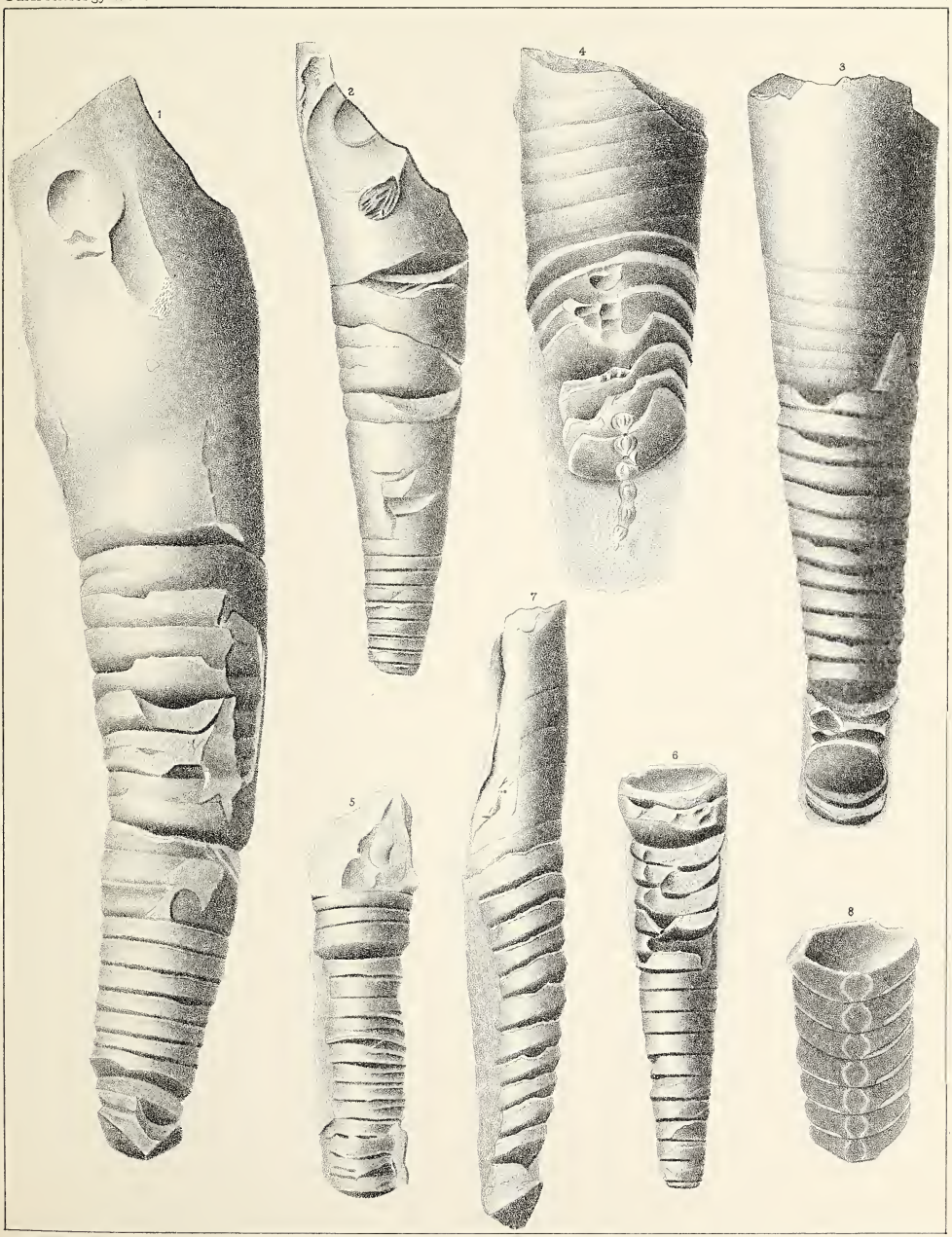
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PLATE LXXVIII.

Orthoceras obliquum, O. vastator, n. sp.*

Page 243.

Fig. 1. A fragment, retaining a large portion of the chamber of habitation, and about twenty adjacent chambers. (Ventral view?)

Fig. 2. A septum from figure 1 showing the position of the siphuncle, and the areola surrounding its insertion in the septum.

Fig. 3. Lateral view of another fragment presenting the extreme, but apparently normal, obliquity of the septa.

Fig. 4. A small septate portion of an individual referred to this species. The specimen is flattened in a dorso-ventral direction, destroying the curvature of the septal margins over the dorsal and ventral sides.

Orthoceras luxum.

Page 244.

See Plates 35, 76, 77, 78 B, 81. 112.

Fig. 5. A fragment of this species considerably compressed. This figure represents a common condition of the specimens. *Schoharie, N. Y.*

Fig. 6. A septum of the preceding specimen, showing the areola surrounding the siphuncle, and extending to the ventral side.

Fig. 7. Longitudinal section of a distorted fragment, preserving some traces of the siphuncle. *Clarksville, N Y.*

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* The name *O. obliquum* having been preoccupied by Eichwald in 1860, the name of this species is here changed to *O. vastator.* See corrections and Addenda.

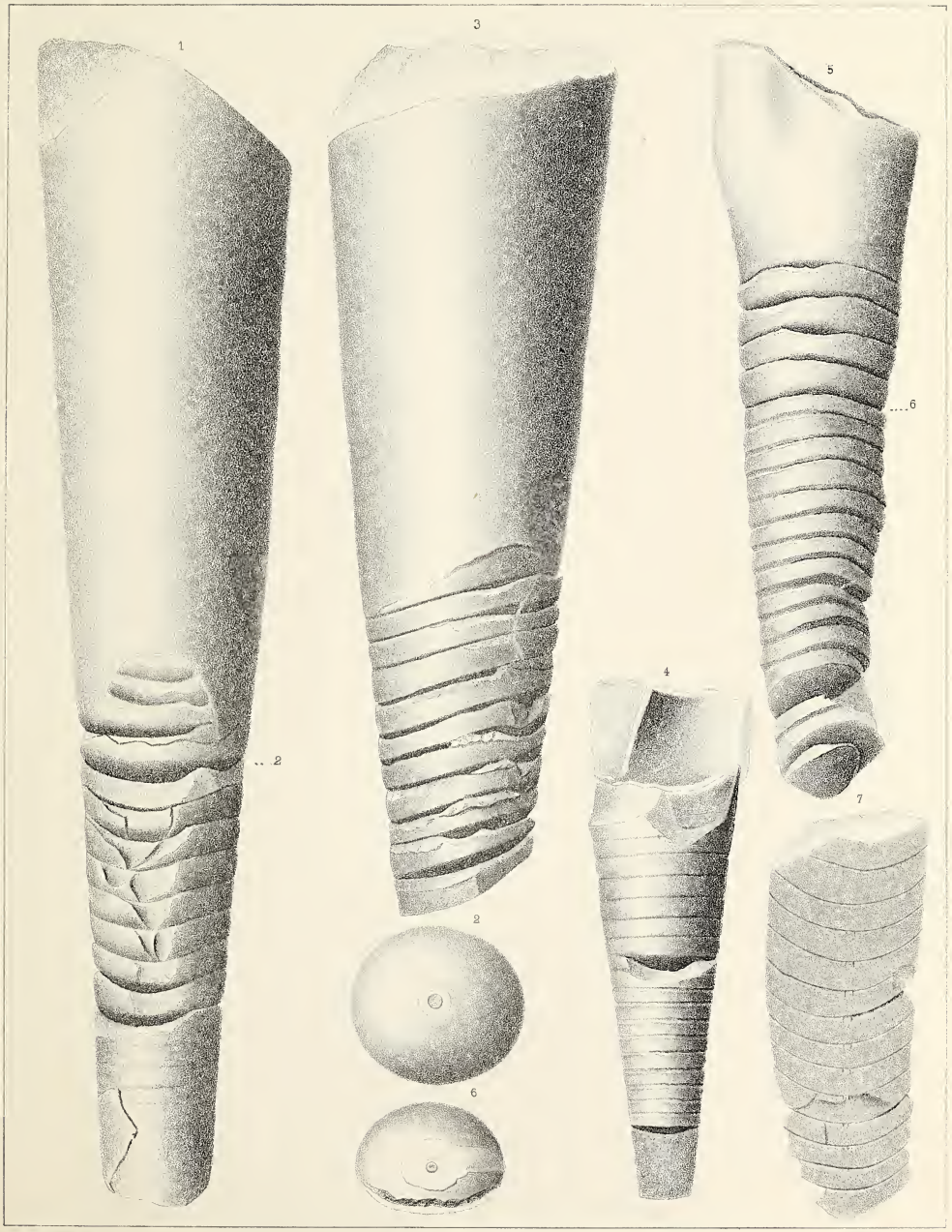
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PLATE LXXVIII A.

ORTHOCERAS PROCERUS.

Page 249.

See Plate 35, 79.

Fgi. 1. An individual with more distant septa and larger apical angle than usual. *Schoharie, N. Y.*

Fig. 2. A smaller septate fragment, with the suture lines of the septa somewhat oblique from pressure. The apparent constriction of the tube is only a break in the continuity of the substance. *Schoharie, N. Y.*

Fig. 3. A septum of preceding specimen, showing the excentric siphuncle.

Fig. 4. An individual retaining the longitudinal keel on the chambers, indicating the ventral side. *Schoharie, N. Y.*

Fig. 5. A septum showing the size and position of the siphuncle. An areola, shown on the specimen, is not represented.

Fig. 6. A small, compressed, chambered fragment, with the septal sutures somewhat curved; due to the compression.

Fig. 7. A septum of preceding specimen showing the siphuncle participating in the general compression.

Fig. 8. Longitudinal section of an individual. No traces of the siphuncle can be observed. The raised areola on the septum, around the siphuncle, is shown in section at the lower extremity.

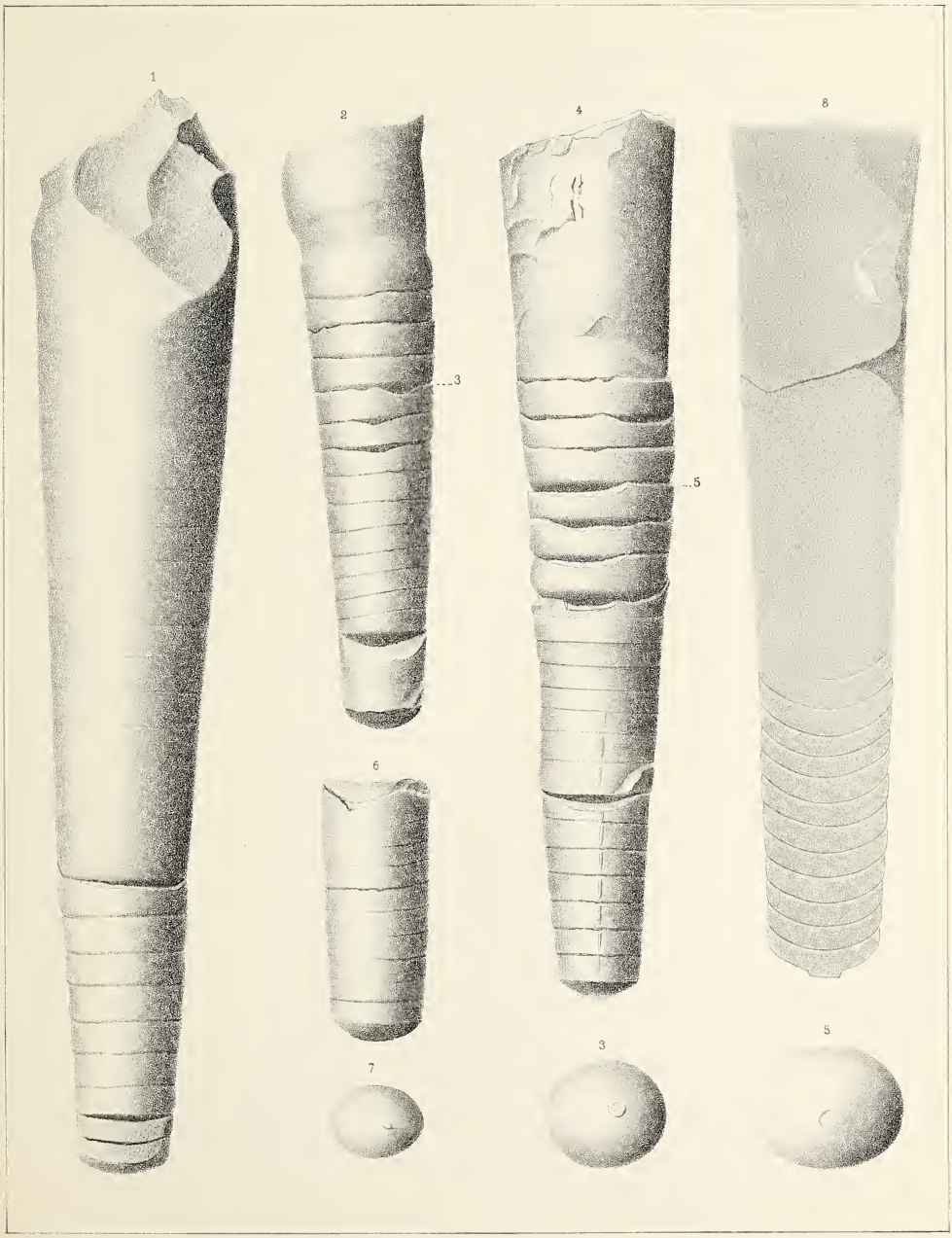
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PLATE LXXVIII B.

Orthoceras masculum.

Page 238.

Fig. 1. A fragment showing the great depth of the chambers, and gradual enlargement of the tube. The crenulations of the upper margin of the chamber walls, impressed upon the interior cast, are shown along the septal line of several of the chambers. *Clarksville, N. Y.*

Orthoceras Pelops.

Page 233.

See Plates 35, 35 A, 37.

Fig. 2. An individual of this species retaining a large portion of the chamber of habitation, and eleven other chambers. The sinuate direction of the striæ upon the chamber of habitation is not due to a proper sinus of the ornamentation, but to the repairing of a fracture in the shell, which had thus become thickened and is preserved, while the other portions are dissolved. *Knox, N. Y.*

Orthoceras luxum.

Page 244.

See Plates 35, 76, 77, 78, 81, 112.

Fig. 3. Longitudinal section showing the elements of the siphuncle, and amount of organic deposit. The specimen is the same as the one figured on plate 77, figure 8, where the details are not sufficiently or accurately represented.

Orthoceras tetricum.

Page 251.

See Plate 80.

Fig. 4. A septate fragment preserving the test as replaced by the material of the rock. Several individuals of a species of Spirorbis are attached to the upper portion. *Clarksville, N. Y.*

Orthoceras Thoas.

Page 261.

See Plates 41, 79, 80, 112.

Fig. 5. A fragment retaining a large portion of the chamber of habitation and four other chambers Remains of the surface-markings are preserved on a portion of the tube. This specimen illustrates the extreme variation in the prominence and distance of the annulations. *Clarksville, N. Y.*

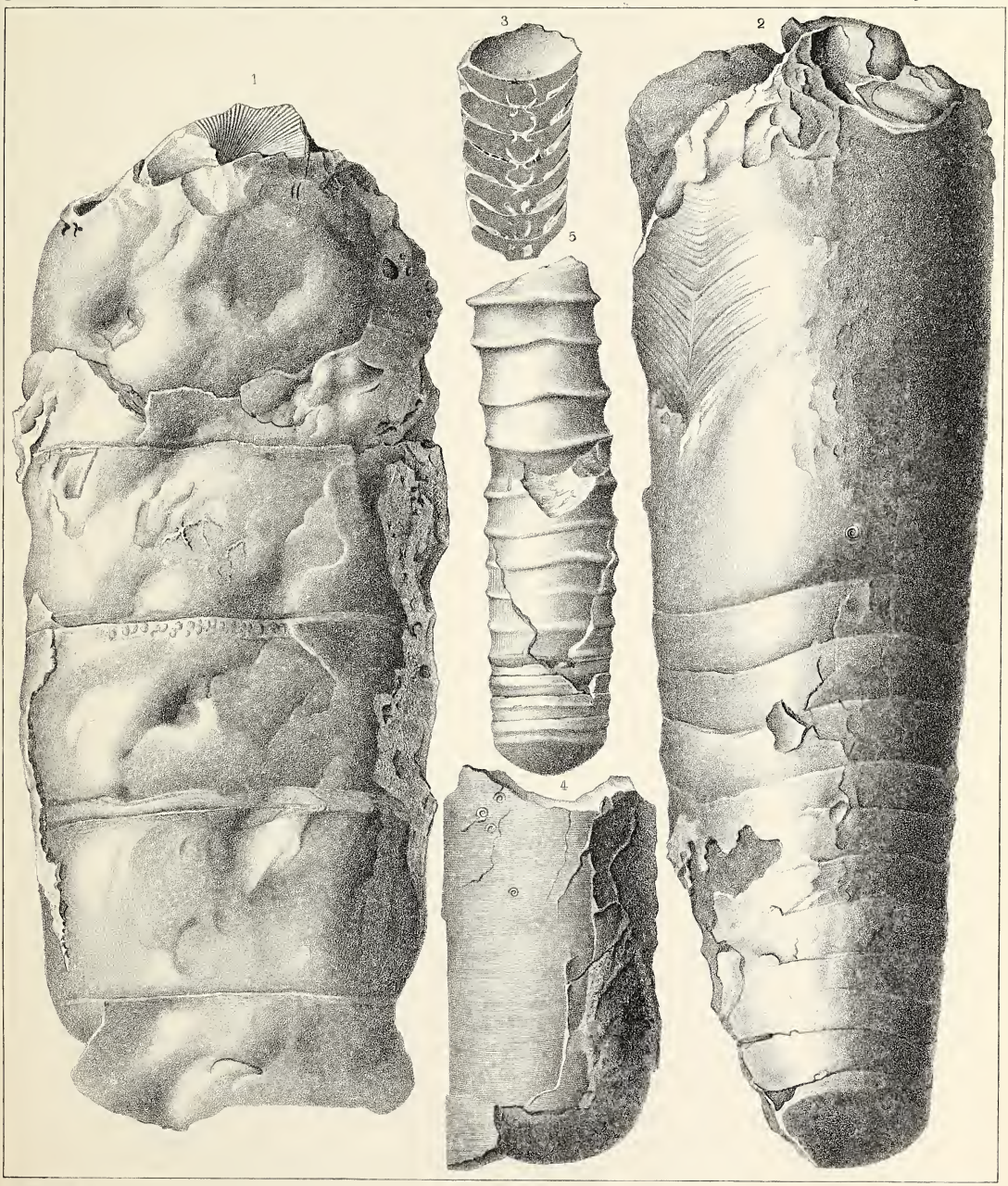
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PLATE LXXIX.

Orthoceras stylus.

Page 253.

See Plate 36.

Fig. 1. A longitudinal section of specimen, fig. 2, pl. 36, showing the depth of the air-chambers. No evidences of the siphuncle are visible.

Fig. 3. Septum showing the size and position of the siphuncle.

Orthoceras varum.

Page 259.

See Plate 112.

Fig. 2. A longitudinal section of a fragment, showing the contour of the chamber of habitation and three of the air-chambers.

Fig. 4. An individual preserving a large portion of the grand chamber and ten of the oblique air-chambers. *Schoharie, N. Y.*

Orthoceras procerus.

Page 249.

See Plate 35, 78 A.

Fig. 5. A septate fragment showing the arching, transverse striæ.

Fig. 6. A septum of the preceding showing the size and slight excentricity of the siphuncle.

Fig. 7. Another fragment, somewhat flattened from compression, retaining the surface ornaments similar to the preceding specimen.

Fig. 8. An enlargement of a portion of the exterior from the side of a specimen, fig. 7.

Orthoceras pervicax.

Page 257.

Fig. 9. An individual preserving a portion of the chamber of habitation and twenty-two of the air-chambers. Lateral view; one side of the specimen shows a longitudinal carina, indicating the ventral side. *Schoharie, N. Y.*

Fig. 10. A septum of the specimen, showing the excentric siphuncle, and its distance from the ventral margin of the septa.

Orthoceras medium.

Page 254.

Fig. 11. A septate fragment showing the distance between the septa and the carina along the ventral walls of the chambers.

Fig. 12. A septum of the preceding specimen showing the size and position of the siphuncle.

Orthoceras Thoas.

Page 261.

See Plates 41, 78 B, 80, 112.

Fig. 13. A fragment referred to this species principally on account of the distance between the septa. The annulations are more frequent than usual, and oblique, while the septa are oblique in the opposite direction. This variation is probably due to a natural deformity in the shell.

Orthoceras Creon.

Page 260.

Fig. 14. A view of a specimen, somewhat flattened from compression, preserving four of the air-chambers, and a portion of the outer chamber, showing the fluted ornamentation of the tube made by the elevated, longitudinal striæ. The septal sutures should curve slightly more than is represented.

Fig. 15. A septum of the preceding showing the size and position of the siphuncle, which has participated in the effects of compression.

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PLATE LXXX.

Orthoceras collatum.

Page 252.

Fig. 1. A septate fragment, showing a very cylindrical tube and a slight distortion from pressure. The septa are not all represented, being somewhat obscure, giving the appearance of great irregularity in the depth of the chambers. *Schoharie, N. Y.*

Fig. 3. The anterior portion of an individual, retaining the chamber of habitation and five adjacent chambers. A marked and peculiar constriction is shown on the upper portion of the chamber of habitation.

Fig. 4. A septum of the preceding specimen, showing the size and position of the siphuncle, and the amount of flattening of the tube from compression.

Orthoceras tetricum.

Page 251.

See Plate 78 B.

Fig. 2. A septate fragment, showing the smooth and flat chamber walls. *Clarksville, N. Y.*

Fig. 5. A fragment, very much broken, but retaining its normal form and convexity. A portion of the test remaining on the specimen is not represented in the figure.

Fig. 6. Septum of the preceding specimen, showing the position of the siphuncle and the circular transverse section of the tube.

Fig. 8. A longitudinal section of a small septate fragment, showing the depth of the chambers and the concavity of the septa. No traces of the siphuncle can be observed. *Schoharie, N. Y.*

Fig. 9. A longitudinal section of a larger individual, with a portion of the chamber of habitation. The interior of the tube contains several specimens of *Streptelasma* and other fossils, shown in section. *Schoharie, N. Y.*

Orthoceras Thoas.

Page 261.

See Plates 41, 78 B, 79, 112.

Fig. 7. A septum of specimen fig. 4, pl. 41, showing the position of the siphuncle, and the indentation made in its passage through the septum. *Schoharie, N. Y.*

Fig. 10. A longitudinal section of an individual, retaining the chamber of habitation and one adjacent chamber.

Fig. 11. A longitudinal section of a small septate fragment, showing the depth of the chambers, and the projections made by the siphuncle in its passage through the septa. Traces of a nummuloid siphuncle, shown in the specimen, are not represented.

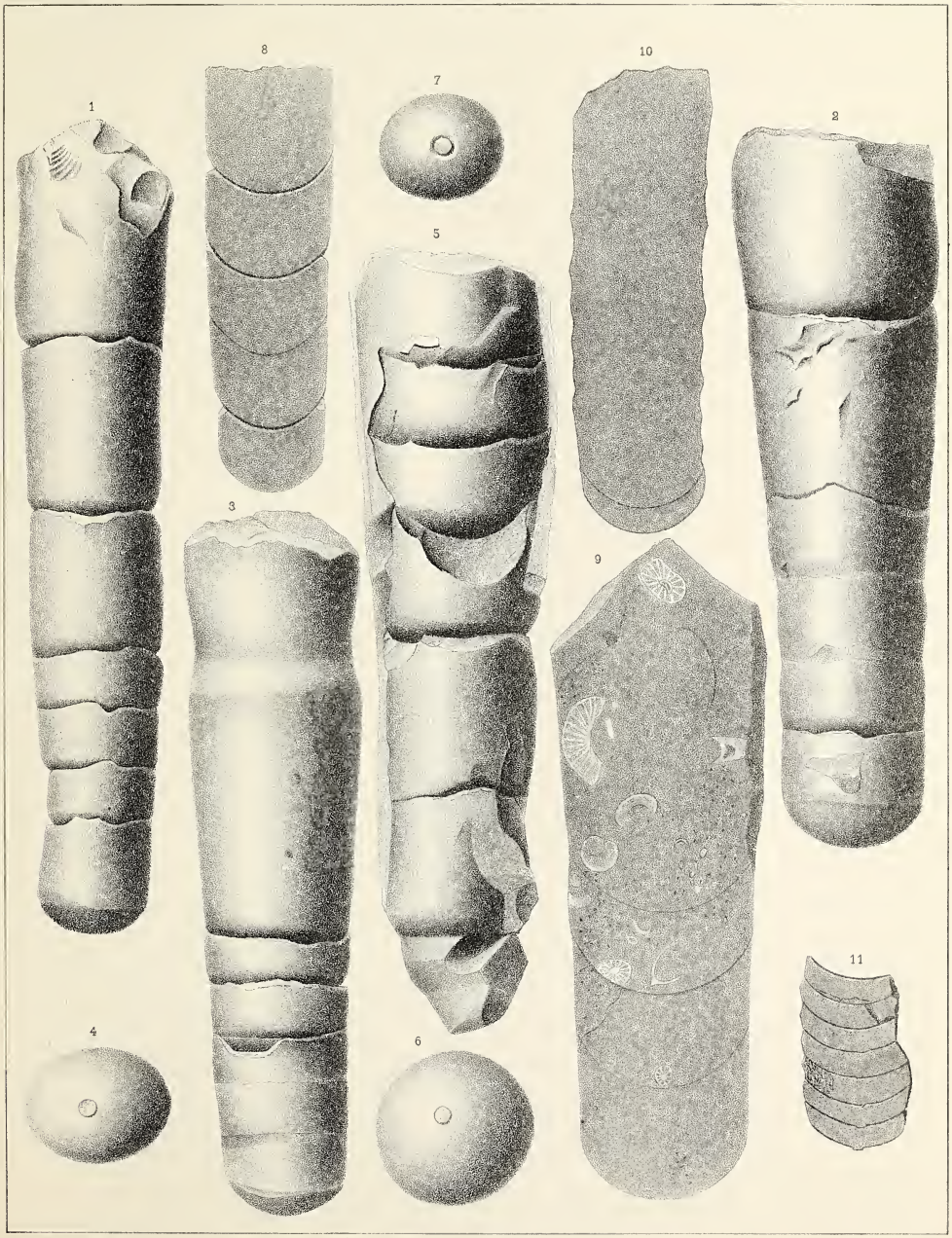
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PLATE LXXXI.

Orthoceras pravum.

Page 255.

See Plates 35, 36, 112.

Fig. 1. An individual, preserving the base of the chamber of habitation and eight adjacent chambers. The specimen is much flattened and distorted from compression; the chambers have become partially separated along one side, and their normal form much modified. *Clarksville, N. Y.*

Fig. 2. A septate fragment, showing the regularity in the depth of the chambers and the gradual enlargement of the tube. The lower portion has been flattened, producing a longitudinal furrow, as represented in the figure, probably from the infolding and subsequent erosion of the shell. The ornamentation on the margins of the septa and on the chamber walls is not shown in the figure.

Fig. 3. A small fragment of five chambers, showing the concave and convex chamber walls, as produced by compression. *Schoharie, N. Y.*

Fig. 4. A longitudinal section of three of the chambers of the preceding specimen, showing the indentations in the septa made by the siphuncle. No traces of the siphuncle, in its passage through the chambers, can be observed. The figure does not quite correctly represent the depth of the chambers, and is not complete above.

Fig. 5. Ventral view of two chambers from the upper portion of the specimen figure 2, showing the extension of the areola to the margin of the septa, and its surrounding with concentric striæ.

Fig. 6. The apical portion of an individual, presenting the appearance of a gradual absorption and final truncation of the shell. The siphuncle has become exposed from the process of weathering. Sharp longitudinal striæ, partially represented, but shown over several chambers, are probably the remains of the ornamentation or vascular markings on the septa. *Schoharie, N. Y.*

Fig. 7. A septum, showing the areola and its striæ surrounding the siphuncle and extending to the ventral margin.

Fig. 8. Another example, similar to the preceding, somewhat enlarged.

Orthoceras oppletum.

Page 248.

See Plate 112.

Fig. 9. Ventral view of a fragment, showing the lamellose striæ on the chambers and septa, and the cylindrical aggregation of the organic deposit around the siphuncle. *Schoharie, N. Y.*

Fig. 10. Lateral view of the preceding specimen. The striæ are seen to be concentric about a point on one of the septa.

Fig. 11. A septum of the preceding specimen, showing the size and position of the siphuncle.

Fig. 12. A fragment, with the cavities of the chambers nearly filled with an organic deposit. *Schoharie, N. Y.*

Orthoceras luxum.

Page 244.

See Plates 35, 76, 77, 78, 78 B, 112.

Fig. 13. A septate fragment, with the exterior walls of the chambers removed, leaving the cylinder of organic deposit surrounding the siphuncle. The septa are closer together, and the furrows on the cylinder are smaller than in the preceding species.

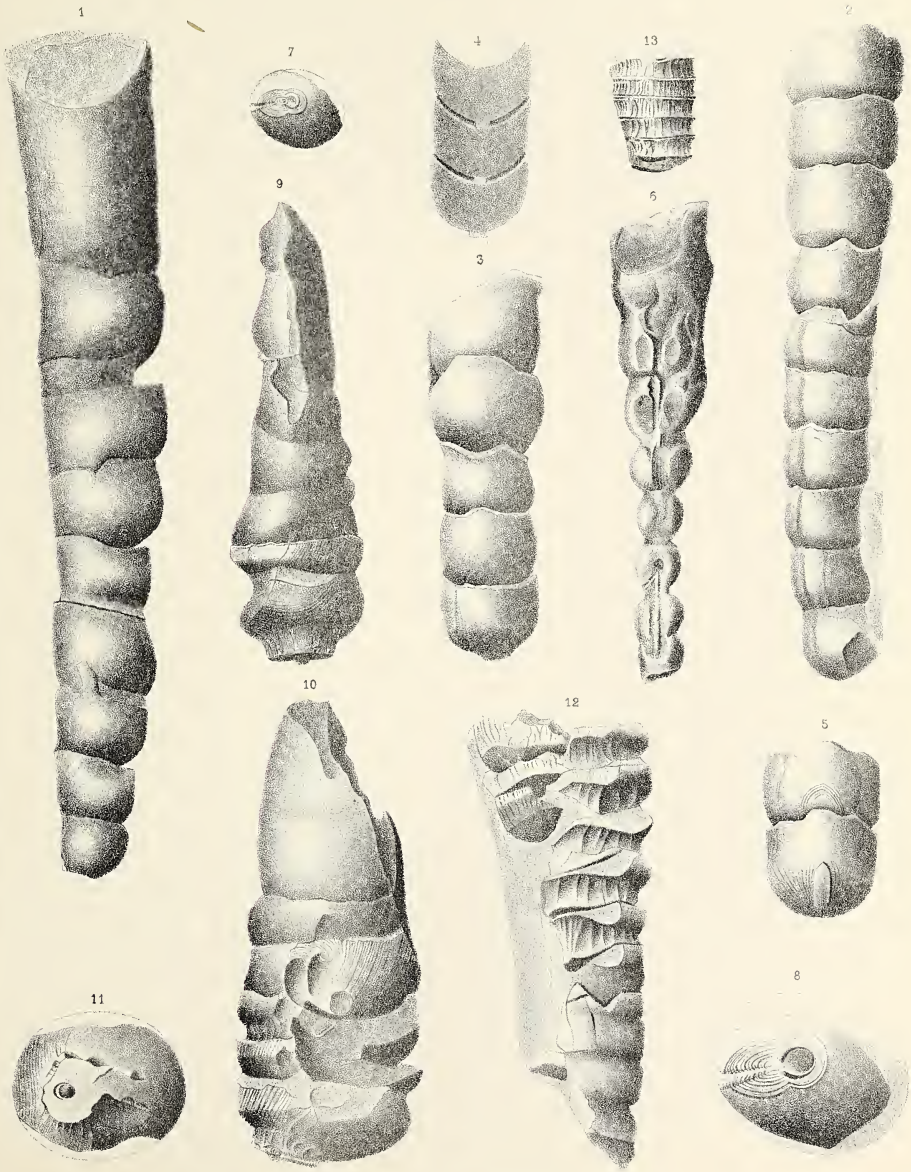
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PLATE LXXXII.

Orthoceras crotalum.

Page 296.

See Plates 42, 113.

Fig. 1. An imperfect specimen, showing the characters of the tube at the aperture, and the surface-markings of the shell. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 2. A fragment with the annulations somewhat irregular in frequency. The tube has a slight curvature, either natural or from compression. *Delphi, N. Y.*

Fig. 3. A small, slightly compressed specimen, showing the surface ornaments, and the increase in the prominence of the annulations toward the larger extremity. *East shore of Cayuga Lake, N. Y.*

Fig. 4. A lateral view of the same, showing a curvature of the tube near the apex.

Fig. 5. The initial extremity, showing the incipient annulations of the apex. *East shore of Cayuga Lake. N. Y.*

Fig. 6. The apical portion of an individual, showing more satisfactorily the increase in the prominence of the annulations, and the gradual change in their frequency toward the chamber of habitation. *East shore of Cayuga Lake, N. Y.*

Orthoceras Ægea.

Page 295.

Fig. 7. A fragment of the chambered portion, showing the annulations and surface-markings of the shell.

Fig. 8. A septum of the preceding, showing the central position of the siphuncle.

Fig. 9. A fragment of the internal mould. The furrows in this example are nearly the reverse of the exterior surface, as shown on other specimens. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 10. A small fragment preserving the surface ornamentation. *Geneseo, Livingston county, N. Y.*

Fig. 11. A portion, apparently, of the chamber of habitation, showing the low, transverse undulations, and the strong longitudinal ridges with smaller intermediate ridges and striæ. *Geneseo, Livingston county, N. Y.*

Fig. 12. A fragment of a large individual, similar to the preceding, showing the low undulations of the tube. In the calcareous beds of the Hamilton group in *Madison county, N. Y.*

Fig. 13. A septum of the same, showing the position of the siphuncle.

Orthoceras nuntium.

Page 299.

Figs. 14, 15. Longitudinal sections of specimens firmly imbedded in the surrounding rock, and not furnishing sufficient data for positive determination. The specimens are referred to this species on account of their association.. *Pratt's Falls, Onondaga county, N. Y.*

Orthoceras cælamen.

Page 298.

See Plates 42, 43, 113.

Fig. 16. A portion of the test enlarged, from specimen fig. 10, pl. 42, showing the characteristic rounded, interrupted, longitudinal striæ, crossed by finer striæ and broad, lamellose lines of growth. *Ontario county, N. Y.*

Orthoceras Œdipus.

Page 294.

See Plate 37.

Fig. 17. A crushed fragment of the chamber of habitation and several attached air-chambers, preserving portions of the test, and showing on the internal mould the strong longitudinal ridges. *Geneseo, Livingston county, N. Y.*

Orthoceras Thestor.

Page 302.

Fig. 18. A fragment, with the upper portion of the tube flattened from compression, and partially covered with the adhering shell. The figure shows the very numerous, regular annulations of the tube. Marcellus shale. *Schoharie, N. Y.*

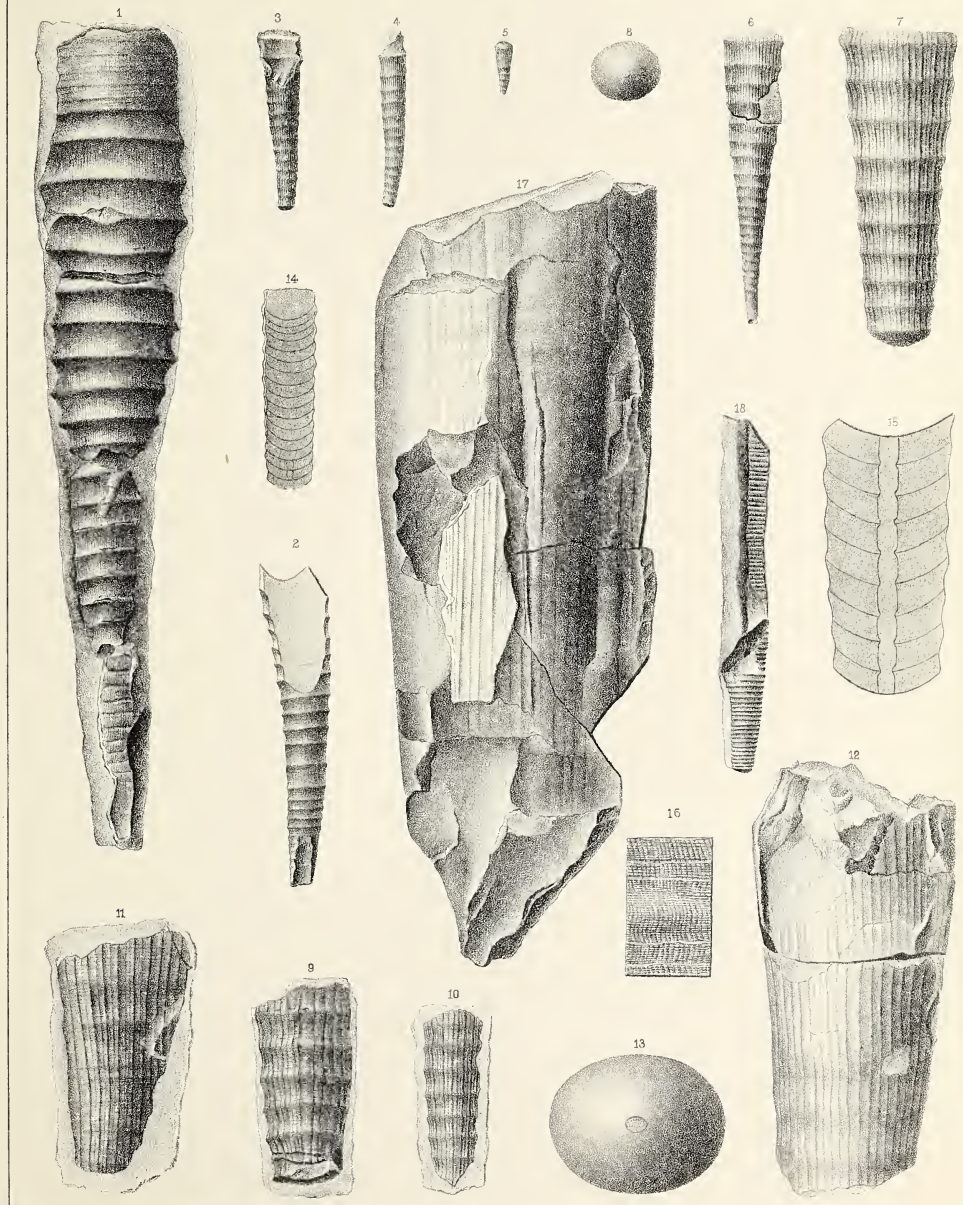
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PLATE LXXXIII.

Orthoceras Marcellense.

Page 278.

See Plates 38, 113.

Fig. 1. Ventral view of a fragment showing, on the cast, a longitudinal convex line on each side of the median carina.

Fig. 2. Ventral view of a larger fragment preserving portions of the test, and showing the ventral carina along the internal mould of the air-chambers. Goniatite limestone. *Manlius, N. Y.*

Fig. 3. A longitudinal section showing the position and elements of the siphuncle, and the depth of the air-chambers.

Fig. 4. A septum, showing the elevated areola around the siphuncle, and its extension to the ventral side.

Fig. 5. Ventral view of the same, showing the elevation of the areola, and the continuation of the areolar process over the walls of the air-chamber. These two figures are from the lower extremity of specimen figure 2.

Fig. 6. A septum showing the elevated areola and radiating vascular markings, extending to the margins.

Fig. 7. A septum showing a simple areola without extension to the ventral margin, and surrounded by obscure, radiating, vascular markings.

Fig. 8. A septum nearer the outer chamber, without distinct areolar markings, showing the position of the siphuncle. *Manlius, N. Y.*

Fig. 9. The concave surface of a septum, which has become distorted from compression.

Fig. 10. An enlargement of the surface, showing broad, flat, transverse striæ, without any evidences of longitudinal markings.

Fig. 12. An enlargement similar to the preceding, from another part of the specimen, with sharper striæ of growth, and strong longitudinal lines.

Orthoceras fustis.

Page 281.

See Plate 113.

Fig. 11. A portion of the surface enlarged, showing the minutely undulating striæ of growth, and fine longitudinal striæ. *Schoharie, N. Y.*

Orthoceras, sp. undetermined.

Page 304.

Fig. 13. A fragment of undetermined specific relations. The surface of a septum is covered with numerous individuals of a species of *Spirorbis*. Hamilton group. *Ontario, Canada West.*

Orthoceras Bebryx.

Page 275.

See Plates 38, 39, 84.

Fig. 14. A fragment much compressed and weathered, with the siphuncle exposed, showing its elements. *Skaneateles Lake, N. Y.*

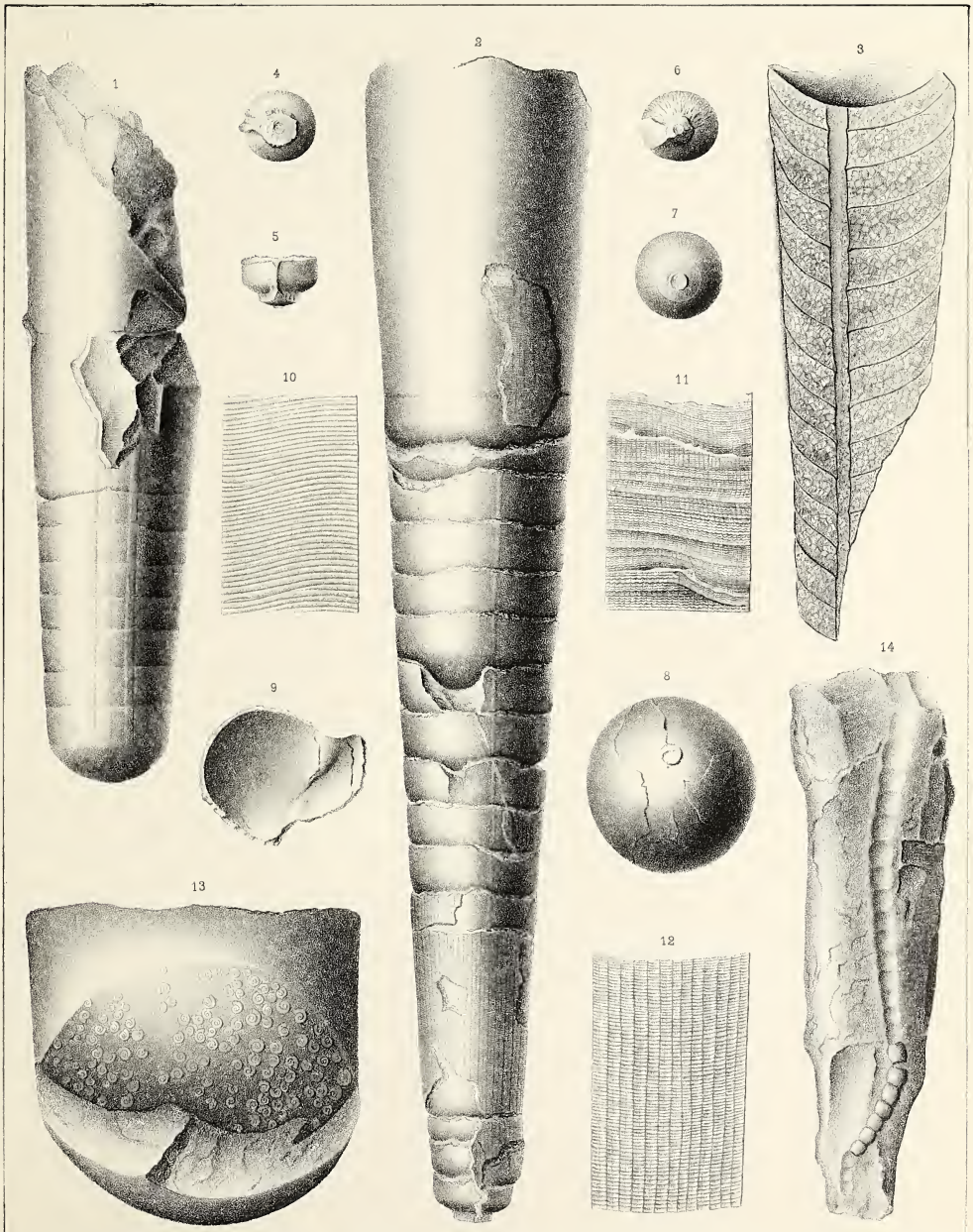
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PLATE LXXXIV.

Orthoceras subulatum.

Page 283.

See Plates 38, 86.

Fig. 1. A fragment in which the last air-chambers are destroyed by maceration and compression, and the action of iron pyrites. This is a common condition with the specimens in the soft shales.

Fig. 2. A larger individual in the same condition of preservation as the preceding, retaining the greater part of the apical portion.

Fig. 4. The apical portion of an example, showing the regular increase in the depth of the air-chambers from the apex to the larger extremity.

Fig. 6. A fragment of a small individual, preserving the test with its markings over a portion of the tube.

Fig. 7. Another individual nearly entire, but somewhat compressed. The exterior test covers the anterior air-chambers.

Fig. 7 + *id.* A portion of the surface enlarged to show the fine, regular, longitudinal striæ, and the more irregular lines of growth.

Fig. 8. An individual retaining the test over nearly the entire exterior.

Fig. 9. An enlargement of the surface of a specimen similar to figs 1, 2, showing the fine, irregular, lamellose lines of growth.

Fig. 10. A septum showing the position of the siphuncle. The specimens of this species here represented are all from the softer shales of the Hamilton group at *Pratt's Falls, Onondaga county, N. Y.*

Orthoceras exile.

Page 290.

See Plates 39, 85.

Fig. 3. The chambered portion of a large individual, which has been flattened from compression. Some of the septal sutures are oblique from this cause. The apical portion has been macerated and the characters obliterated in a manner similar to figs. 5, 6, pl. 87. Hamilton group. *Hamburgh, Erie county, N. Y.*

Orthoceras tersum.

Page 286.

Fig. 5. Dorsal view of a fragment. The other side of the specimen shows the ventral carina along the tube.

Orthoceras Bebryx.

Page 275.

See Plates 38, 39, 83.

Fig. 11. A septum of a small fragment referred with doubt to this species, showing the subcentral position of the siphuncle.

Fig. 12. An outline from another individual, showing the normal, circular, transverse section of the tube. *York, Livingston county, N. Y.*

Orthoceras constrictum.

Page 288.

See Plate 85.

Fig. 13. A compressed chamber of habitation. The septa marking several air-chambers, composing the lower part of the figure, are not represented. The specimen is covered with a branching parasitic Bryozoan.

Fig. 14. The chamber of habitation of an individual showing a constriction near the middle.

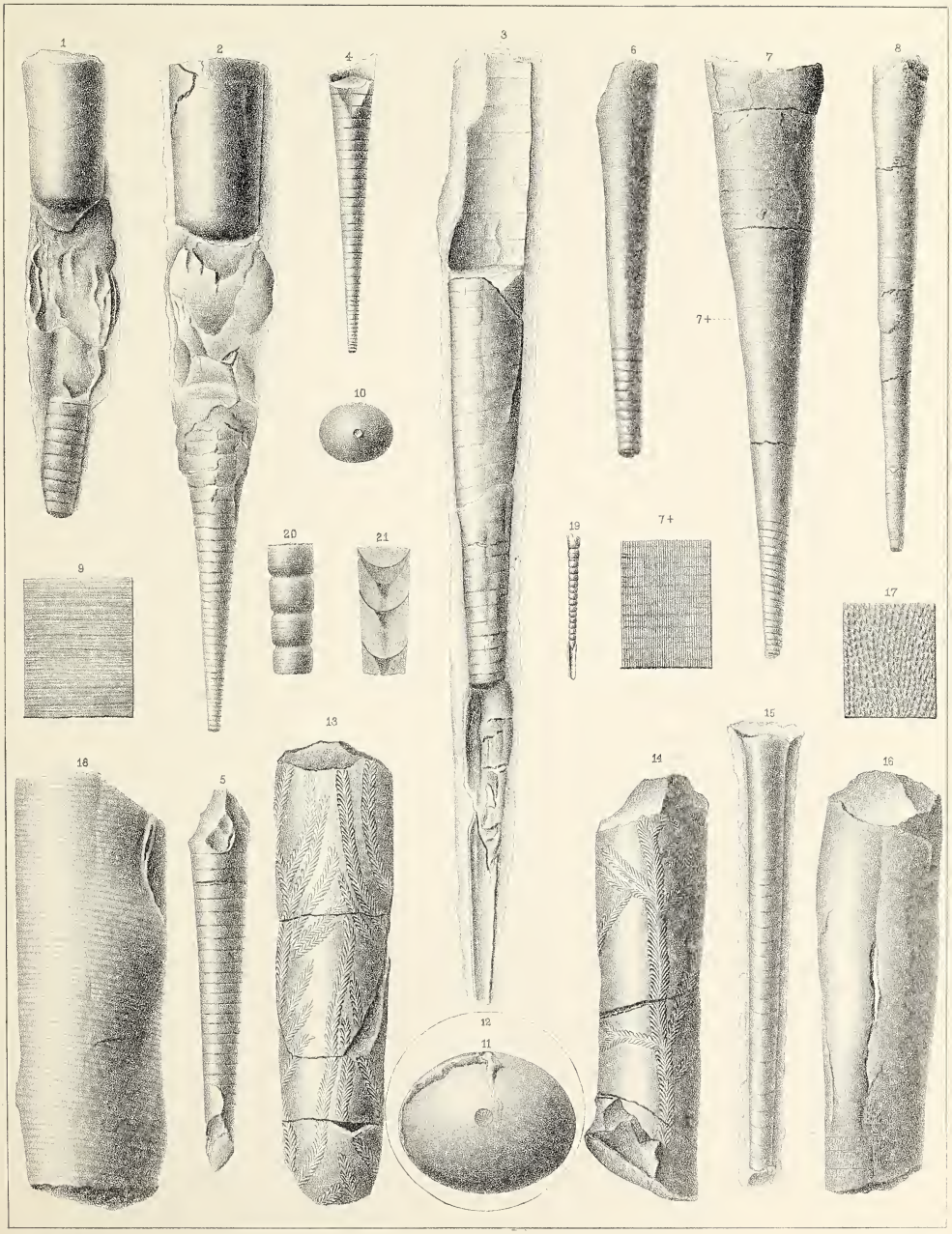
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PLATE LXXXIV—*Continued.*

Fig 16. A specimen that has been much compressed and broken in the shale, preserving the chamber of habitation and several of the air-chambers.

Fig. 17. An enlargement of a Bryozoan, encrusting the lower portion of the preceding specimen. The spinules are apparently only the casts of the interior of the cell tubes, the material of the organism having been dissolved. The specimens of this species are all from the coarser shales of the group at *Cazenovia, N. Y.*

Orthoceras aulax.

Page 293.

Fig. 18. A fragment showing the prominent, regular transverse furrows and ridges. The longitudinal, finer striæ are not represented. *Hamburgh, Erie county, N. Y.*

Orthoceras scintilla.

Page 293.

See Plate 113.

Fig. 19. A septate fragment which has been macerated, giving the sutures an undue degree of depression.

Fig. 20. An enlargement of three air-chambers of the preceding specimen, showing traces of transverse striæ.

Fig. 21. A longitudinal section of another fragment, cutting the cone on one side of the siphuncle, but not through the axis. *Norton's Landing, Cayuga Lake, N. Y.*

Bactrites clavus.

Page 316.

See Plate 113.

Fig. 15. Lateral view of a specimen preserving a portion of the chamber of habitation and twenty-five air-chambers, and showing an expansion of the tube at the aperture, due to a deposit of iron pyrites. The figure does not fully represent the characters of the species. The chamber of habitation in the specimen figured is somewhat longer than represented. The exposed surface of the tube is flattened from its natural elliptical form, and the suture lines curve forward, and down over the dorsal and ventral sides. Marcellus shales. *Scholarie, N. Y.*

PLATE LXXXV.

Orthoceras exile.

Page 290.

See Plates 39, 84.

Fig. 1. The chamber of habitation, with two of the attached air-chambers, showing the regular enlargement of the tube to the aperture.

Fig. 2. A septum of the preceding, showing the circular, transverse section of the tube and the excentric position of the siphuncle.

Fig. 14. A chambered fragment of an individual referred with doubt to this species. The specimen has been much macerated and distorted in the soft shales, which has obscured the specific characters. The exterior shows numerous furrows where the shell has been invaded by some terebrous animal. East shore of *Cayuga lake, N. Y.*

Fig. 15. A specimen in the same association, and similar to the preceding. The apparent expansion and constriction of the tube is due to the action of iron pyrites.

Orthoceras Telamon.

Page 291.

Fig 3. The chamber of habitation of an example, showing its cylindrical form and the absence of any constriction or expansion at the aperture.

Fig. 4. A septum of the preceding, showing the transverse section of the tube and the very excentric position of the siphuncle.

Fig. 12. Ventral view of a small, chambered fragment, showing the depth of the chambers and the gradual enlargement of the tube. A low, longitudinal carina along the ventral side is not represented.

The specimens of this species here represented are from the shales of the Hamilton group, at *Monteith's Point, Canandaigua lake, N. Y.*

Orthoceras constrictum.

Page 288.

See Plate 84.

Fig. 5. A fragment of the chamber of habitation, with two of the attached air-chambers, showing a decided constriction of the tube at the upper extremity. *Cazenovia, N. Y.*

Fig. 10. A fragment retaining a portion of the chamber of habitation and twenty-one air-chambers, showing the very gradual increase in their depth toward the grand chamber. *Cazenovia, N. Y.*

Fig. 11. A chambered fragment, retaining nearly its normal form and proportions. *Monteith's Point, Canandaigua lake, N. Y.*

Fig. 13. A septum of another fragment, showing the position of the siphuncle and the circular, transverse section of the tube. *Monteith's Point, Canandaigua lake, N. Y.*

Orthoceras spissum.

Page 287.

Fig. 6. A fragment embracing a portion of the chamber of habitation and fifteen air-chambers, showing the frequency of the septa and the regular depth of the air-chambers. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 7. A septum of the preceding, showing the position and size of the siphuncle. The section as represented is nearly circular, whereas the transverse section of the tube is broadly elliptical.

Fig. 8. A portion of a larger individual, exhibiting the same characters as the preceding example. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 9. A septum of the preceding specimen, showing the position of the siphuncle. This figure is also too nearly circular in outline. It should be flattened in a dorso-ventral direction.

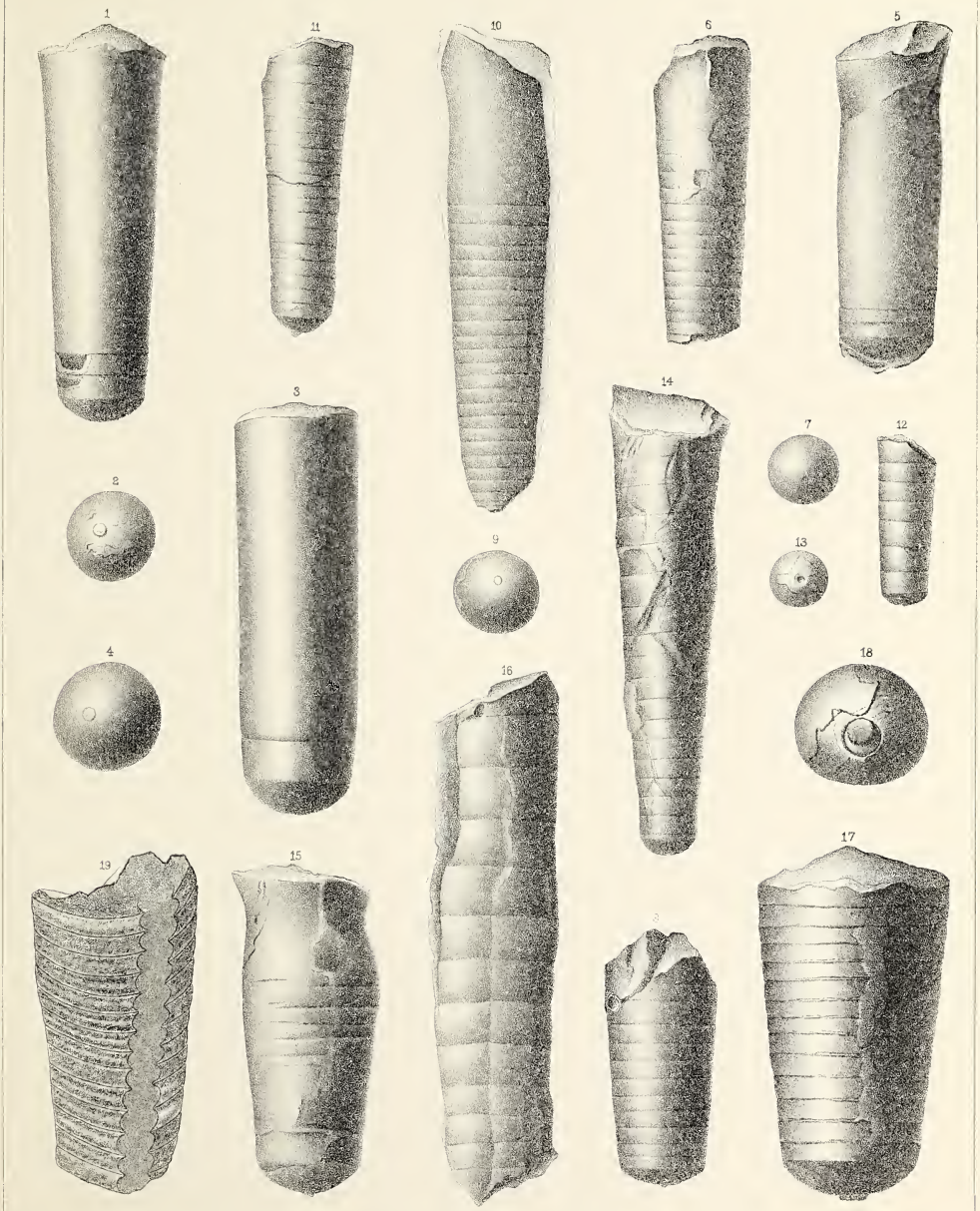
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PLATE LXXXV.—*Continued.*

Orthoceras emaceratum.

Page 292.

See Plate 39.

Fig. 16. A septate fragment, showing the depth of the chambers. The specimen is broken and flattened from compression. Hamilton group. *Jaycox Run, Genesee county, N. Y.*

Cyrtoceras densum.

Page 363.

Fig. 17. A chambered fragment, showing the apical angle of the tube and the regular depth of the air-chambers, with the straight and horizontal septal sutures. Hamilton group. *Cumberland, Md.*

Fig. 18. Septum of the preceding, showing the size and position of the siphuncle, the areola around its insertion in the septa, and the transverse section of the tube.

Fig. 19. A longitudinal section of a fragment, showing the elements of the siphuncle, the concavity of the septa, and a slight exogastric curvature of the tube. Hamilton group. *Cumberland, Md.*

PLATE LXXXVI.

Orthoceras subulatum.

Page 283.

See Plates 38, 84.

Fig. 1. The chamber of habitation nearly entire, and preserving a portion of the test. Hamilton group. *Pratt's Falls, N. Y.*

Fig. 2. A septum of the preceding, showing the central position of the siphuncle.

Orthoceras Bebryx, var. Cayuga.

Page 276.

See Plate 39, 91, 92.

Fig. 3. A fragment of the chambered portion, showing the siphuncle exposed. The specimen has been compressed and the siphuncle displaced, and lying against the interior surface of the chamber walls. Chemung group. *Ithaca, N. Y.*

Fig. 4. A compressed septate fragment, showing the oblique sutures, as produced by compression. Chemung group. *Ithaca, N. Y.*

Fig. 5. A portion of a smaller individual of the same species (?), showing a gentle constriction of the chamber of habitation and traces of the lamellose surface markings.

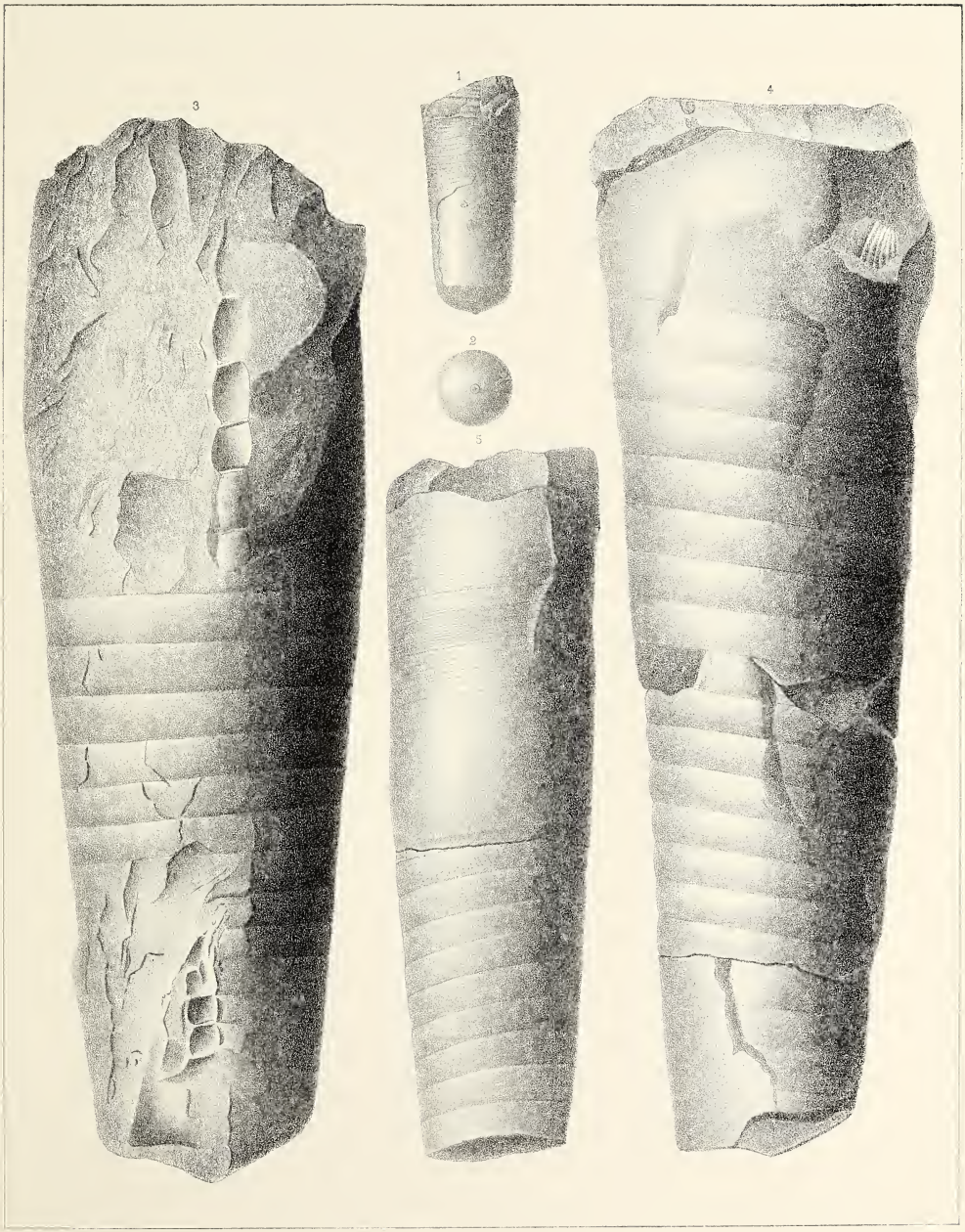
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PLATE LXXXVII.

Orthoceras Eriense.

Page 274.

See Plate 40.

Fig. 1. The chamber of habitation of an individual referred to this species. The specimen is somewhat broken from compression, and the test has been replaced and the surface-markings obliterated by iron pyrites.

Fig. 2. A septum from the preceding specimen, showing the position of the siphuncle and the amount of compression.

Othoceras linteum.

Page 277.

Fig. 3. A fragment, preserving a portion of the chamber of habitation, with the last air-chamber, showing the surface-markings over the entire tube. *Leonardsville, Madison county, N. Y.*

Fig. 4. A portion of the surface enlarged four diameters to show the character of the striæ.

Orthoceras, sp. undetermined.

Figs. 5, 6. Two figures representing a not uncommon condition of preservation of the fossils in the softer shales. The shell has evidently been macerated, and surrounded by a concretionary mass of of the clay forming the shale—the whole being subjected to compression. From the effects of compression, and the mode of accretion, the specimens are often regularly striated, as represented in these figures; and in two specimens of *O. subulatum*, illustrated on plate 84, exhibit the same conditions in the anterior air-chambers: giving the appearance termed "*slickensides.*"

The specimen, figure 5, is from the soft shales at *Pratts Falls, Onondaga county, N. Y.*, and the larger one is found in a similar situation at *Eighteen-mile Creek, on Lake Erie Shore, near Buffalo, N. Y.*

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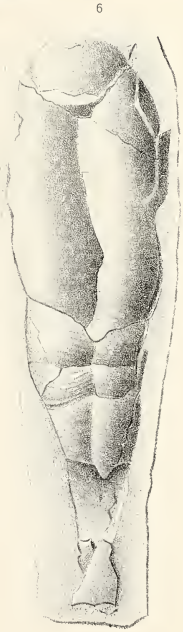
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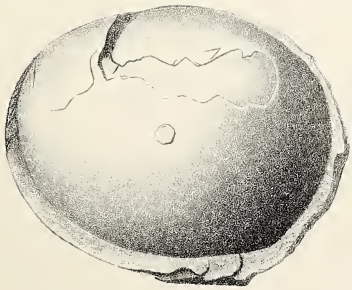
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PLATE LXXXVIII.

Orthoceras Atreus.

Page 305.

See Plate 89.

Fig. 1. A portion of an individual, preserving a large part of the chamber of habitation and nine air-chambers, showing the cylindrical chamber of habitation, with its constriction and the contraction of the tube at the aperture. The specimen is considerably compressed. Several branching, tubular furrows of a terebrous animal are shown traversing portions of the tube. Portage group. *Rogers' Bridge, on the Genesee River below Portageville, N. Y.*

Orthoceras Thyestes.

Page 306.

Fig. 2. A much compressed and broken specimen, showing a portion of the chamber of habitation and twenty-four attached air-chambers. The comparative depth of the air-chambers in this species and *O. Atreus*, and the more rapid enlargement of the tube, is clearly shown in the figures. Several *Craniæ* are attached to the chamber of habitation The ventral valves of two individuals are shown as merely a thickened rim. Three dorsal valves are represented, showing a subcentral apex, and concentric lamellose lines of growth. This species is here designated as *Crania centralis*.

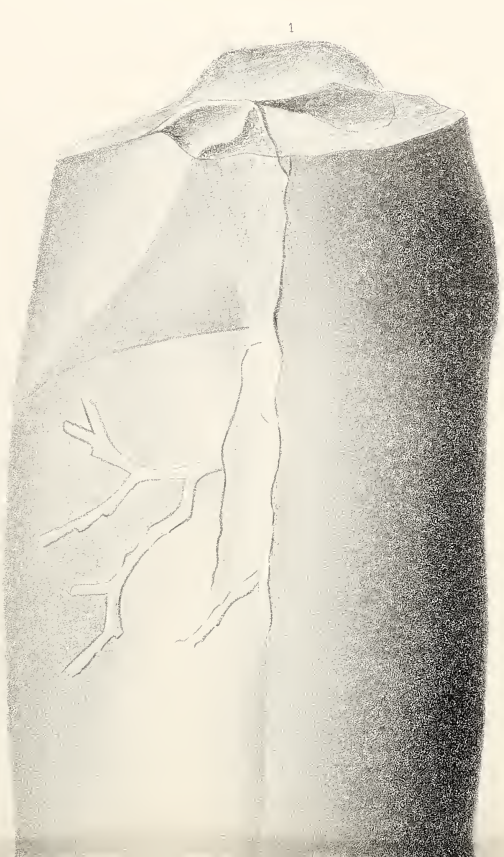
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PLATE LXXXIX.

Orthoceras pacator.

Page 307.

Fig. 1. A fragment of a large individual embracing a portion of the tube near the chamber of habitation, and showing considerable irregularity and variation in the depth of the air-chambers. The specimen is much flattened from compression in the soft shales, and many of its features obscured. Portage group. *Mt. Morris, Livingston county, N. Y.*

Fig. 2. A fragment of a small, compressed individual, showing the constriction of the tube near the aperture, and a curvature and obliquity of the sutures, due to compression.

Fig. 3. An incomplete individual retaining its normal proportions, and showing the chamber of habitation nearly entire. The last two air-chambers are not shown in the figure, making the chamber of habitation appear longer than its true proportions.

Fig. 4. A septum of a larger individual, referred to this species with doubt. The tube is somewhat compressed on one side, and the true position of the siphuncle is not shown. From a septum of specimen figure 3, it is seen that the siphuncle is more excentric than is here represented.

Fig. 5. A septate portion, showing the regular increase in the depth of the air-chambers from the apex, and their irregularity near the outer chamber. Portage group. *Ithaca, N. Y.*

Fig. 6. A fragment of the chamber of habitation, with several attached air-chambers, showing the inequality of the last air-chamber. Portage group. *Ithaca, N. Y.*

Orthoceras, sp. indet.

Fig. 7. A fragment of undetermined, specific relations, which has been incrusted with a Bryozoan of peculiar character.

Fig. 8. A portion of the surface enlarged, showing the epitheca and bases of the cell-pores, as exposed upon a weathered surface.

Orthoceras anguis.

Page 312.

Fig. 9. A compressed fragment, showing the gradually enlarging tube, and the regular, transverse, lamellose striæ of the surface. Lower part of the Chemung group. *Cascadilla Creek, Upper Fall, Ithaca, N. Y.*

Orthoceras Atreus.

Page 305.

See Plate 88.

Fig. 10. A chambered fragment, preserving its natural cylindrical form, and showing the depth of the air-chambers. Calcareous beds of the Portage group at *Penn Yan, Yates county, N. Y.*

Fig. 11. A septum of a small fragment, preserving several chambers, and showing the size and excentric position of the siphuncle. The specimen is referred to this species with some doubt.

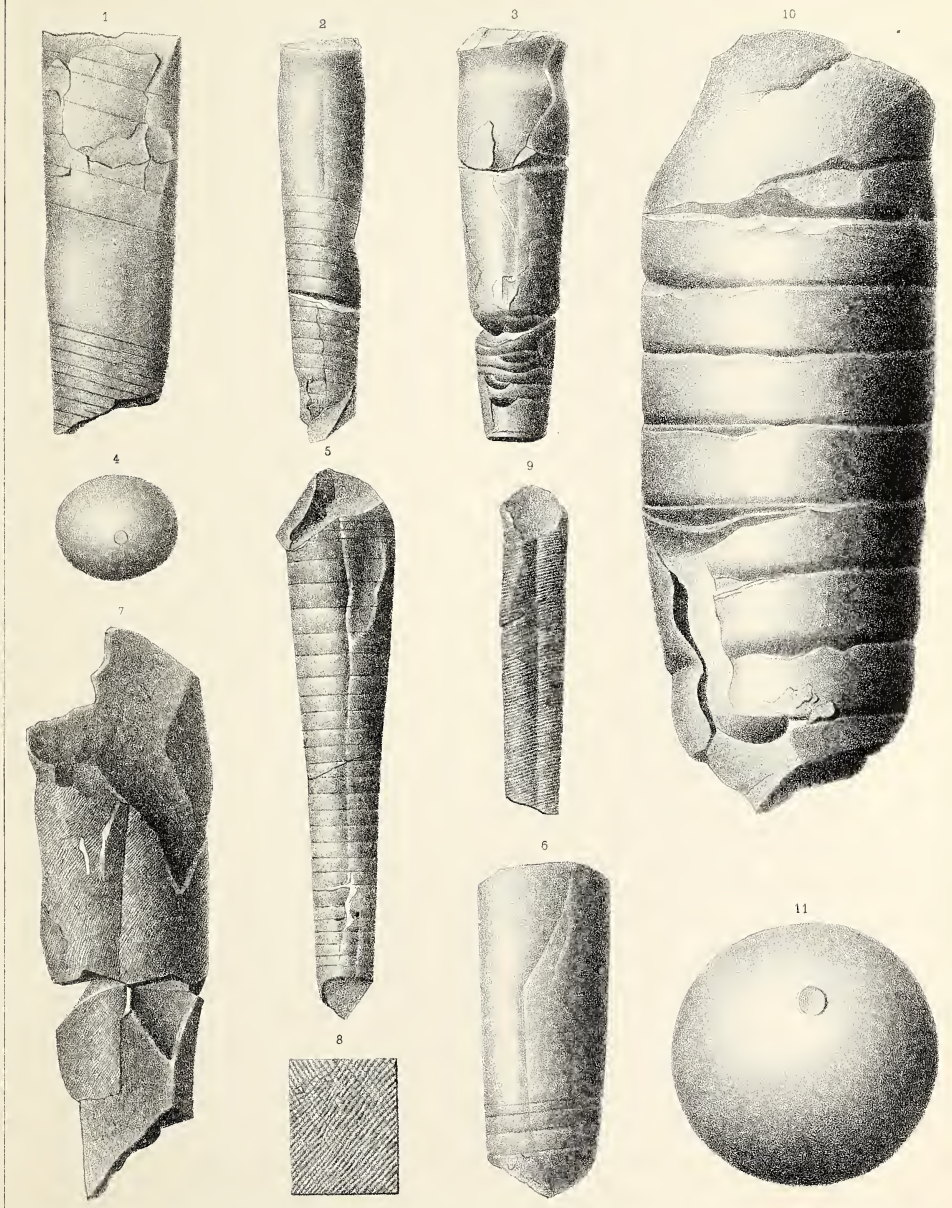
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PLATE XC.

Orthoceras Demus.

Page 311.

Fig. 1. A chambered fragment showing the depth of the air-chambers. The specimen does not preserve any additional characters, and is referred to the species with some hesitation. In the arenaceous shales, at *Philipsburgh, N. Y.*

Fig. 4. A fragment retaining its normal proportions, and showing the characters of the species. Chemung group. *Cascadilla creek, Ithaca, N. Y.*

Fig. 5. A small fragment in which the tube has been filled with iron pyrites, and the characters obscured. Chemung group. *Ithaca, N. Y.*

Orthoceras fulgidum.

Page 310.

Fig. 2. An individual retaining the chamber of habitation nearly entire, and eleven of the attached air-chambers, showing the enlargement of the tube and the distance between the septa. Several fragments of the test are adhering to the internal mould of the tube. Chemung group. *Cascadilla creek, Ithaca, N. Y.*

Fig. 3. A portion of a larger individual somewhat compressed, giving curvature and obliquity to the septal sutures. Chemung group. *Ithaca, N. Y.*

Orthoceras Leander.

Page 309.

Fig. 6. A fragment somewhat compressed at the lower extremity, and showing the siphuncle as exposed from weathering. Chemung group. South of *Ithaca, N. Y.*

Fig. 7. A chamber of habitation and ten attached air-chambers.

Fig. 8. An individual nearly entire, showing the rapid enlargement of the tube and the characters of the chamber of habitation, with the slight expansion and constriction of the tube at the aperture. Upper Chemung sandstone. *Warren, Pennsylvania.*

Orthoceras palmatum.

Page 312.

Fig. 9. Lateral view of a fragment showing the depth of the air-chambers and enlargement of the tube. The ventral side of the specimen shows a longitudinal carina along the cast of the walls of the air-chambers.

Fig. 10. A septum of the preceding, showing the size and position of the siphuncle with the raised areola around its insertion, and the palmate ornamentation extending to the ventral side of the tube. Chemung group. *Southern New York.*

Cyrtoceras? Hector.

Page 364.

Fig. 11. A fragment preserving the greater portion of the chamber of habitation, with several attached shallow air-chambers, showing a slight contraction of the tube at the aperture. Traces of fine striæ of growth shown on the specimen are not represented. Chemung group. *Warren, Penna.*

Fig. 12. Another fragment showing deeper air-chambers. Chemung group. Near *Olean, N. Y.*

Fig. 13 *id.* An opposite view, showing the curvature and obliquity of the suture lines.

Fig. 14 *id.* A lateral view, showing a greater irregularity in the curvature and direction of the sutures.

Fig. 15. An outline showing the transverse section of the tube.

Orthoceras pertextum.

Page 314.

Fig. 16. A fragment without evidences of septa, and showing the character and frequency of the annulations. The surface-markings are shown over the entire surface of the tube. Chemung group. *Ithaca, N. Y.*

Fig. 17. An enlargement of a portion of the surface of the preceding, showing the crenulated character of the striæ.

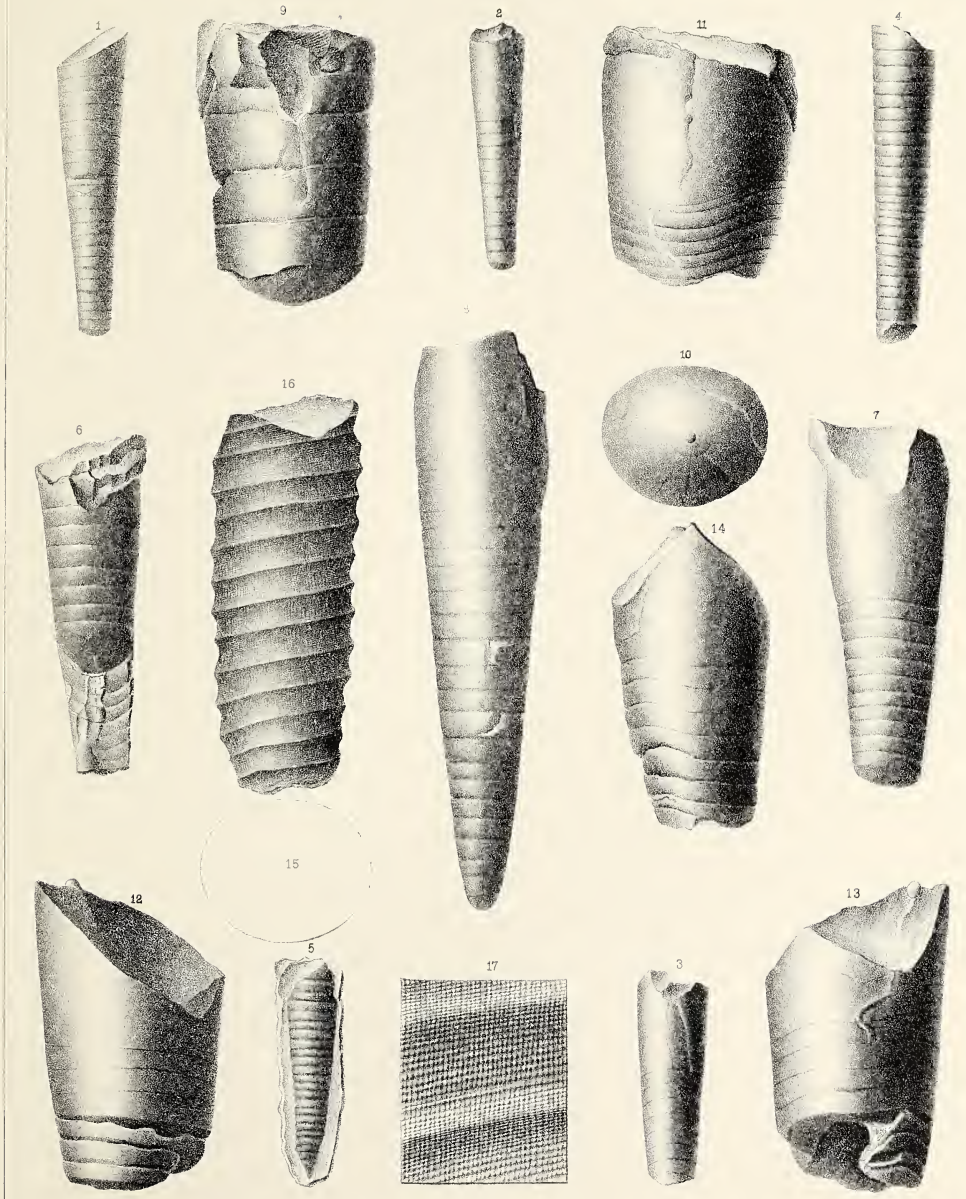
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PLATE XCI.

ORTHOCERAS BEBRYX, var. CAYUGA.

Page 276.

See Plates 39, 86, 92.

Fig. 1. A chambered fragment, showing a gradual increase in the depth of the air-chambers from the apex toward the outer chamber. *Ithaca, N. Y.*

Fig. 2. A large fragment somewhat compressed, showing an obliquity of the sutures, and an irregularity in the enlargement of the tube, due to the compression. *University Quarry, Ithaca, N. Y.*

Fig. 3. A portion of a large individual, showing the cylindrical chamber of habitation, and a nearly uniform distance between the septa. *Earl's Quarry, Ithaca, N. Y.*

Fig. 4. A small fragment showing the concavity of the septa. *Earl's Quarry, Ithaca, N. Y.*

Fig. 5. A septum of the preceding, showing the position of the siphuncle, the effect and amount of the compression.

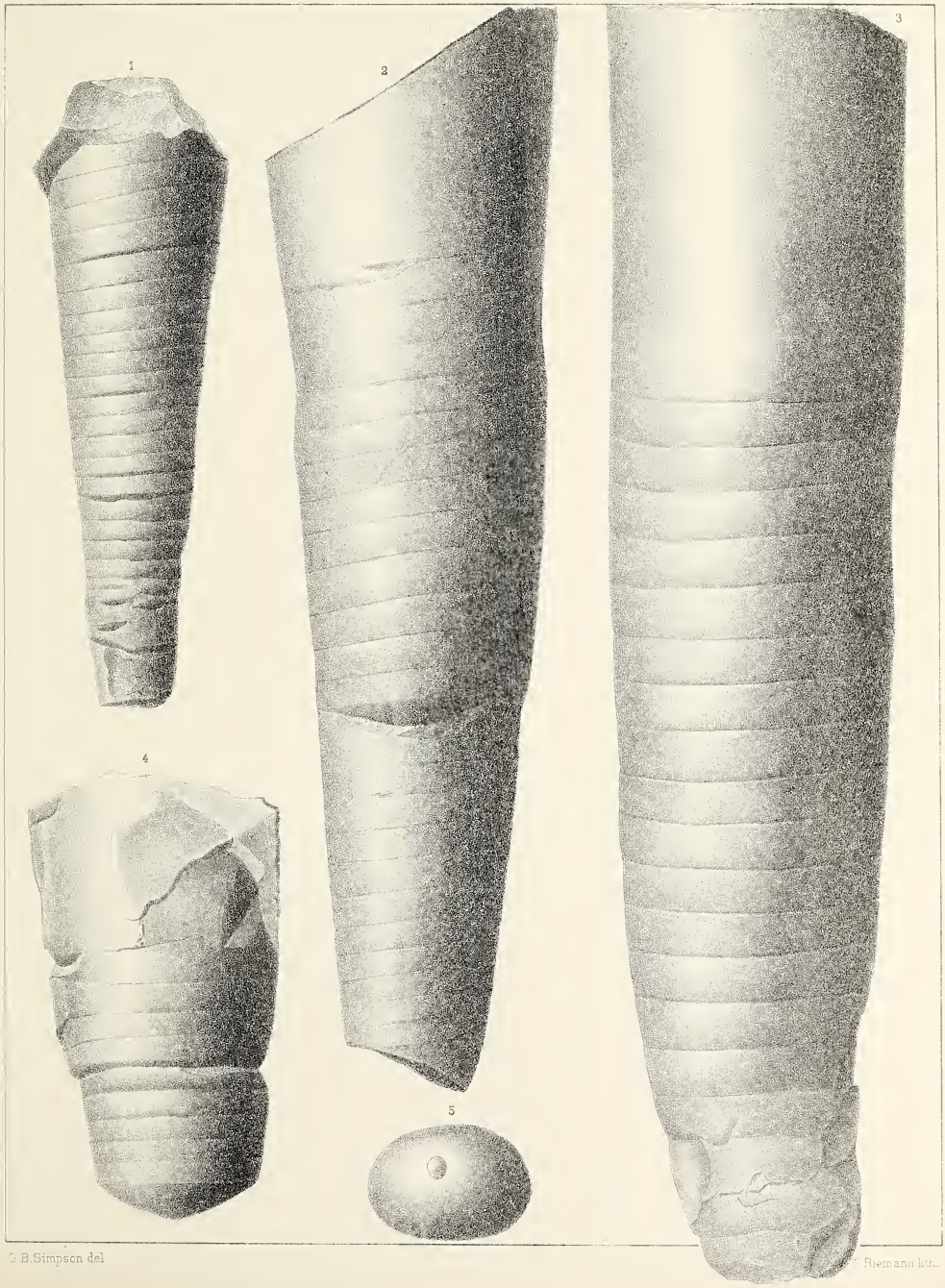
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PLATE XCII.

ORTHOCERAS BEBRYX, var. CAYUGA.

Page 276.

See Plates 59, 86, 91.

Fig. 1. A compressed chamber of habitation, covered with numerous portions of a branching, parasitic Bryozoan.

Fig. 2. A fragment similar to the preceding, with several attached air-chambers, showing surface-markings. The lamellose, transverse striæ form a broad, retral curve over the chamber of habitation and the air-chambers.

Fig. 3. A chambered fragment, showing the effects of compression in a fracture along the centre.

Fig. 4. A portion of an individual retaining its normal form and dimensions, showing the depth of the air-chambers, the concavity of the septa, with straight and horizontal suture lines.

Fig. 5. A septum of the preceding, showing the excentric position of the siphuncle and the circular, transverse section of the tube.

These specimens are from the lower portion of the Chemung group, in the *University quarries at Ithaca, N. Y.*

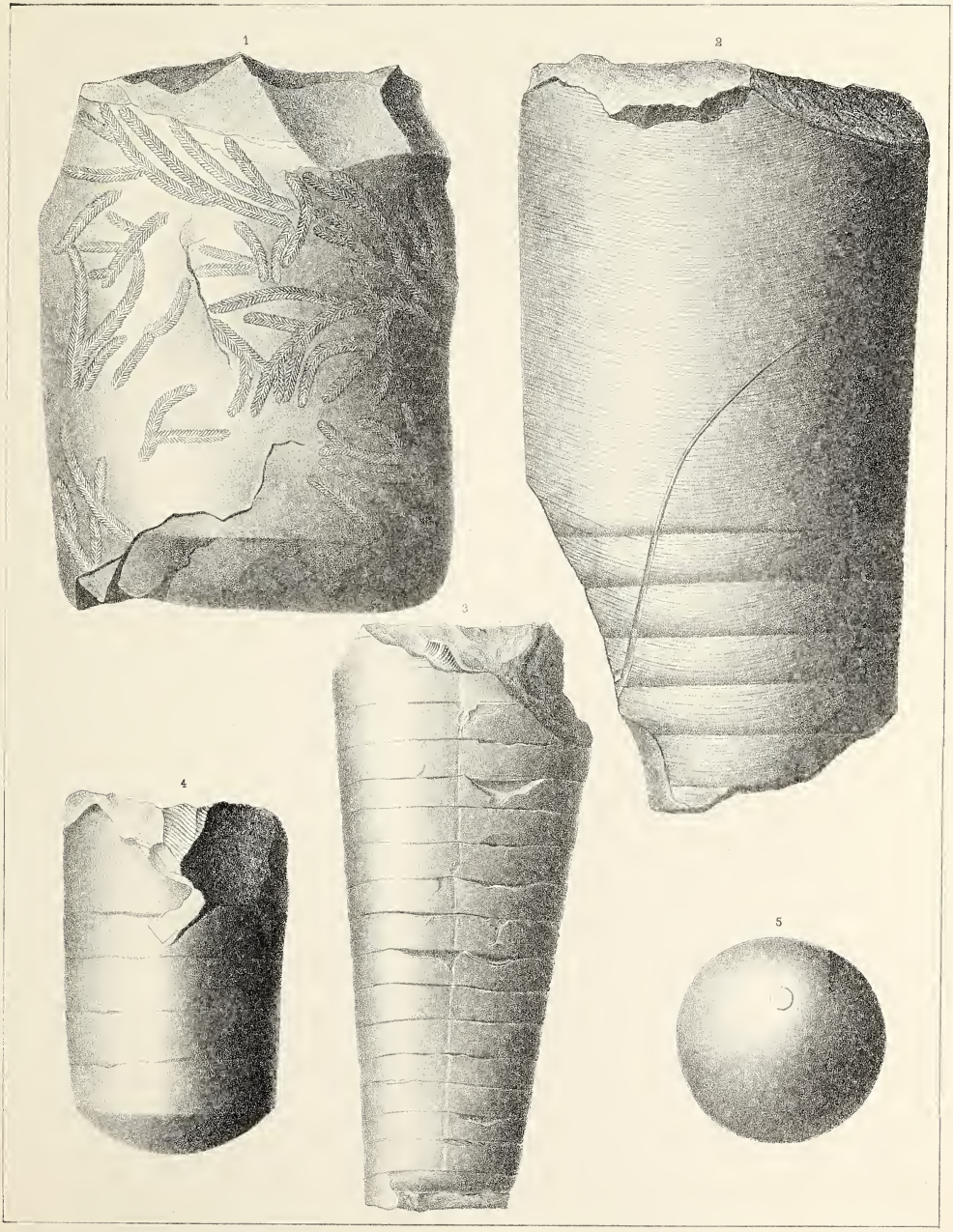
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PLATE XCIII.

Gomphoceras rude.

Page 327.

Fig. 1. Ventral view of the specimen, showing the crenulated band, the depth of the air-chambers, and the siphuncle, as exposed from the process of weathering. The specimen preserves more of the chamber of habitation than is represented in the figure. The curvature and sinus in the margin, as represented in the figure, do not belong to the aperture. Schoharie grit. *Schoharie, N. Y.*

Gomphoceras clavatum.

Page 323.

See Plate 46.

Fig. 2. Ventral view of an individual, showing the characters of the chamber of habitation, near the aperture. Schoharie grit.

Fig. 3. A large, compressed individual, referred with doubt to this species, but preserving several of the specific characters. Schoharie grit. *Schoharie, N. Y.*

Gomphoceras cruciferum.

Page 328.

Fig. 4. A septum, showing the transverse section of the tube and the peculiar cruciform ornamentation around the siphuncle, surrounded by indistinct striæ. The upper, narrower end of the septum is probably the concave side of the tube. Schoharie grit. *Schoharie, N. Y.*

Gomphoceras tumidum.

Page 351.

See Plate 95.

Fig. 5. A fragment of the chamber of habitation, near the aperture, showing the slight sinus in the margin, corresponding to the small aperture.

Fig. 6. A fragment of an individual, showing the ventricose chamber of habitation and the depth of the air-chambers. Chemung group. *Ithaca, N. Y.*

Gomphoceras poculum.

Page 340.

Fig. 7. A portion of an individual, somewhat compressed, showing the variation in the depth of the air-chambers, and the furrows of the crenulations continued over the walls of the chambers. The furrows do not extend over the grand chamber toward the aperture, as represented in the figure, the internal mould of this portion being essentially smooth.

Fig. 8. The opposite side of the apical portion of the preceding, showing the elements of the siphuncle, as exposed from weathering. Hamilton group, near *Cazenovia, N. Y.*

Gomphoceras solidum.

Page 338.

Fig. 9. A large portion of an individual, showing the form of the shell and the depth of the air-chambers. The change of the slope of the sides from the point of greatest gibbosity is more abrupt than is represented. The specimen also shows the crenulated zone, and the crenulations extending over the cast of the walls of the air-chambers. Goniatite limestone. *Manlius, N. Y.*

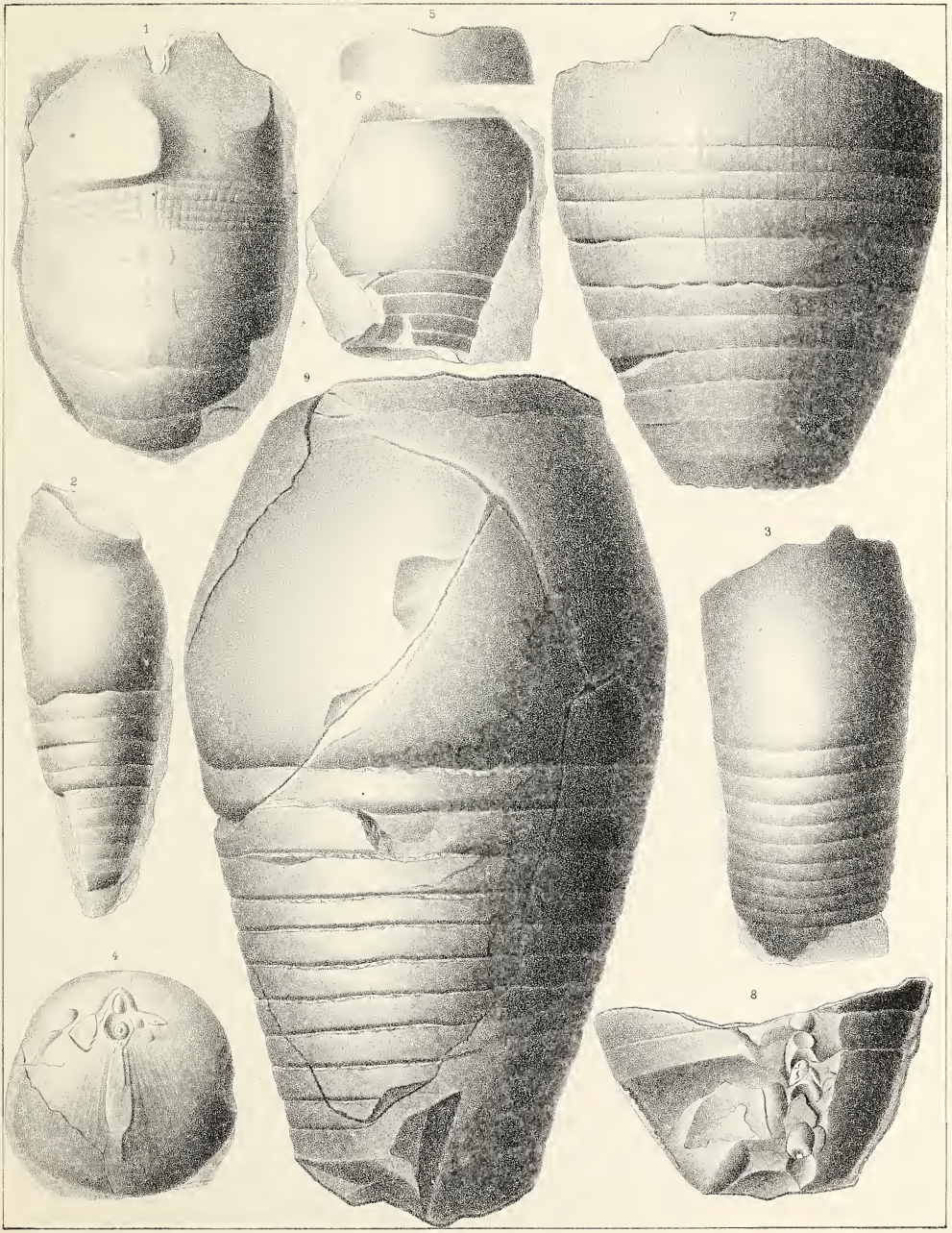
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PLATE XCIV.

GOMPHOCERAS ABRUPTUM.

Page 339.

Fig. 1. A fragment which has been extremely compressed, showing a portion of the chamber of habitation, with the septate part of the shell. A constriction of the tube near the middle of the outer chamber is not represented in the figure. The specimen is covered with a branching, tubular Bryozoan. Hamilton group. *Cazenovia, N. Y.*

GOMPHOCERAS RAPHANUS.

Page 347.

Fig. 2 A fragment preserving several air-chambers and a small portion of the grand chamber, showing the position of the plane of greatest transverse section. Hamilton group. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 3. Septum of the preceding, showing the transverse section of the tube. The siphuncle near the ventral margin of the septum, and surrounded by an areola, is not represented.

Fig. 4. An individual somewhat compressed, but showing the attenuation of the apex and the depth of the air-chambers. The septate portion continues to the point of greatest transverse section at the base of the chamber of habitation, but is not shown in the figure, owing to being covered by the remains of the macerated shell. Hamilton group. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 5. Ventral side of a specimen referred to this species on account of the position of the plane of greatest transverse section and the depth of the air-chambers. The specimen is much compressed, but shows the elements of the siphuncle, as exposed from weathering, and the sinus in the margin of the aperture, corresponding to the small aperture. The margin of the aperture is entire, and not broken, as represented. Hamilton group. *Cazenovia, N. Y.*

Fig. 10. A fragment preserving the same form and proportions shown in specimen fig. 2. The siphuncle, as shown at the ventral margin of the septa, is not represented. Hamilton group. *Pratt's Falls, Onondaga county, N. Y.*

GOMPHOCERAS OVIFORME.

Page 344.

See Plates 45, 46.

Fig. 6. Ventral view of the chamber of habitation, showing the small aperture, the constriction of the tube, and the fossa of the crenulated zone at the base. The furrows of the crenulations, extending over the zone and the greater portion of the grand chamber, are not represented. Goniatite limestone. *Schoharie, N. Y.*

Fig. 7. The last septum of another specimen, showing the size and position of the siphuncle, and the transverse section of the tube. Goniatite limestone. *Schoharie, N. Y.*

GOMPHOCERAS AJAX.

Page 350.

Fig. 8. A portion of the chamber of habitation and three air-chambers, showing the size of the tube and the features of this portion. The striæ and furrows of the crenulations, as continued over the walls of the air-chambers in the specimen, are not shown in the figure. Portage group. *Penn Yan, N. Y.*

GOMPHOCERAS PINGUE.

Page 346.

See Plate 95.

Fig. 9. A fragment showing the ventricose form of the shell and the curvature of the sides of the chamber of habitation toward the aperture. Hamilton group. *Cazenovia, N. Y.*

(GOMPHOCERATIDÆ .)

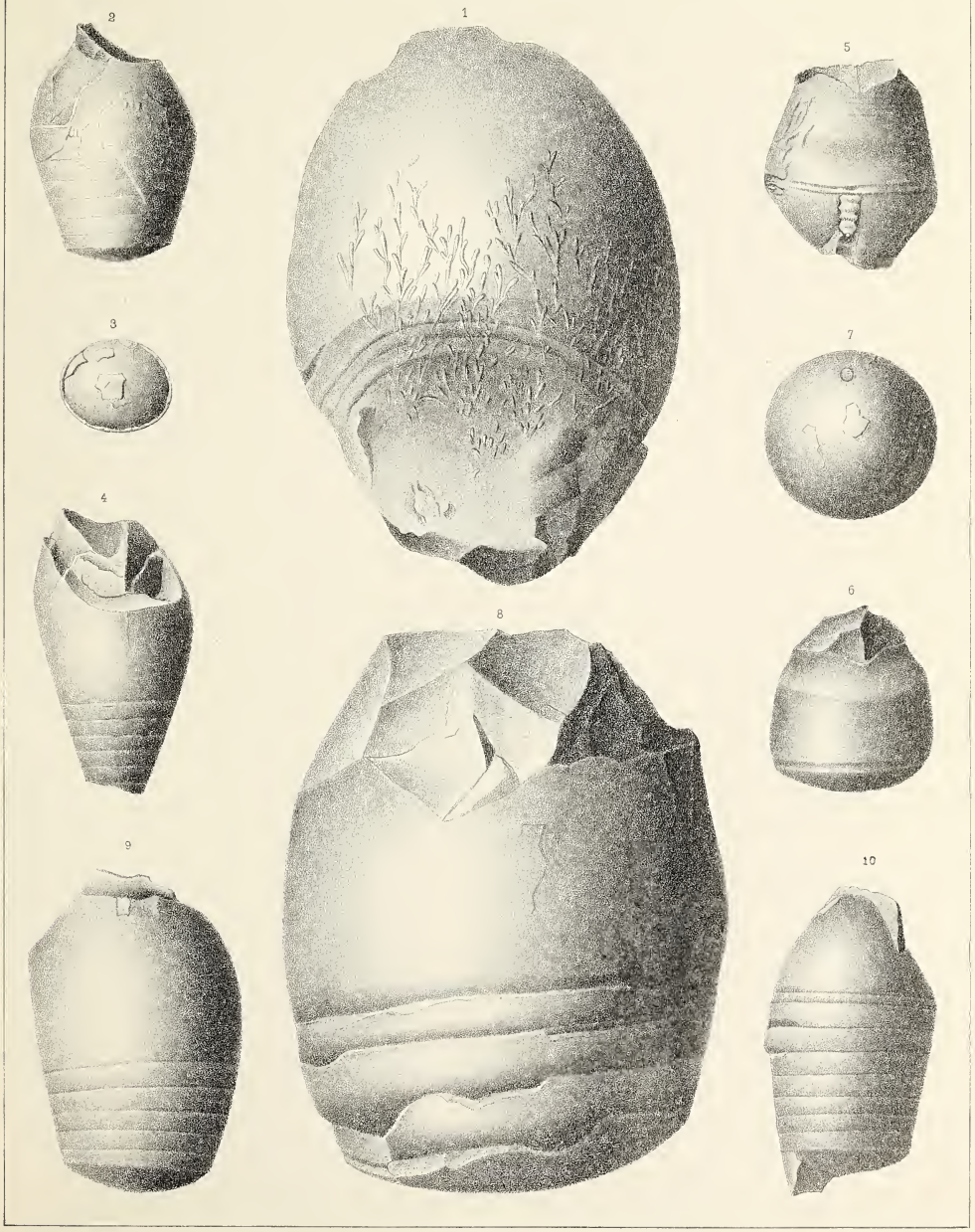

PLATE XCV.

Cyrtoceras liratum.

Page 364.

Fig. 1. Lateral view of the specimen, showing the curvature of the tube, the septate apical portion, and the regular, longitudinal furrows ornamenting the shell. Goniatite limestone. *Marcellus, N. Y.*

Gomphoceras tumidum.

Page 351.

See Plate 93.

Fig. 2. The apical portion of an individual, showing the depth of the air-chambers and the enlargement of the tube. Chemung group. *Ithaca, N. Y.*

Fig. 3. An imperfect fragment, which has been much disturbed by compression, doubtfully referred to this species, but occurring in the same association with the preceding. Chemung group. *Ithaca, N. Y.*

Fig. 4. A compressed individual, showing the branches of a parasitic Bryozoan on the surface of the tube. Chemung group. *Cascadilla Creek, Ithaca, N. Y.*

Fig. 5. A fragment preserving its normal proportions, and showing the ventricose chamber of habitation and attenuate apex. Upper Chemung group. *New Albion, Cattaraugus county, N. Y.*

Fig. 7. A specimen much compressed, but showing the attenuate apex and subglobose chamber of habitation. Several branches of two species of parasitic Bryozoans are attached to the grand chamber. Chemung group. *Ithaca, N. Y.*

Gomphoceras pingue.

Page 346.

See Plate 94.

Fig. 6. The apical portion of an individual which has been disturbed by compression, but referred to this species on account of its association and the depth of the air-chambers. Hamilton group. North of *Cazenovia, N. Y.*

Cyrtoceras (Gomphoceras) formosum.

Page 362.

Fig. 8. The chamber of habitation, showing the surface ornaments of the tube, which become in part obsolete near the aperture. The lines in the figure, crossing the hiatus in the margin of the aperture, do not appear in the specimen. Hamilton group. *Dresden, N. Y.*

Fig. 9. An enlargement of the surface, showing more minutely the characters of the ornamentation.

Gomphoceras lunatum.

Page 341.

Fig. 10. The chamber of habitation, with several attached air-chambers.

Fig. 11. A septum of the same, showing the position of the siphuncle and the areola around its insertion.

Fig. 12. The apical portion, which is a continuation of specimen fig. 10, showing the enlargement of the tube and the variation in the depth of the air-chambers. Portions of the test, showing the ornamentation of the surface, the crenulations and ventral furrow, are not represented in the figure.

Fig. 13. A longitudinal section of several air-chambers, showing the concavity of the septa and the elements of the siphuncle. The section does not pass through the axis of the siphuncle, and does not show the passage of the tube through the septa. Hamilton group. *Hamburgh, Erie county, N. Y.*

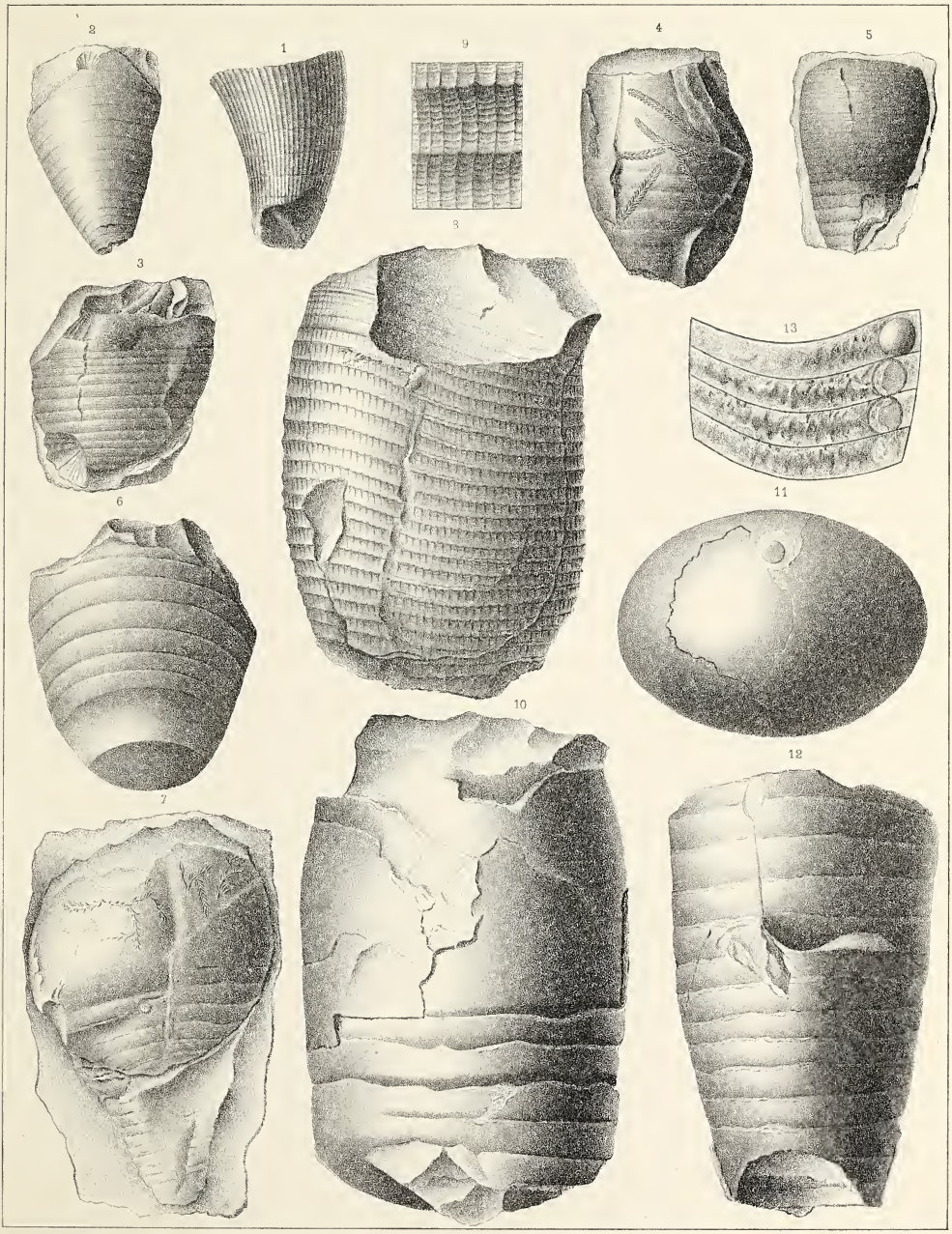
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PLATE XCVI.

CYRTOCERAS EUGENIUM.

Page 369.

See Plates 36, 47, 97.

Fig. 1. Ventral view of the internal mould of a fragment, showing the extension of the transverse ridges of the test into the surrounding matrix, and the sinus of the annulations on the ventral side.

Fig. 2. A small fragment of a large example, showing the sinus of the ornaments on the ventral side.

Fig. 3. A gutta-percha mould of a laterally compressed fragment, showing the distance between the costæ, and the effects of the compression on the sinus, which is made much deeper and abrupt.

Fig. 4. Lateral view of a large, imperfect individual, showing the prominence and frequency of the expansions of the test. The figure is from a gutta-percha mould of the impression of the shell in the rock after it has been removed in the process of weathering.

Fig. 5. A fragment preserving the internal mould of a portion of the tube, and the matrix of the lower portion, showing the concavity of the septa and the extension of the lamellæ.

Fig. 6. A portion of the chamber of habitation with two attached air-chambers, showing the sinus of the ornaments and the greater frequency of the ridges toward the aperture. The walls of the air-chambers show a furrow left by the removal of the siphuncle in the process of weathering.

Fig. 7. A septum of the preceding, showing the position of the siphuncle and the amount of compression, in a ventro-dorsal direction, to which the tube has been subjected.

Fig. 8. Ventral view of the chamber of habitation of an individual which has been laterally compressed.

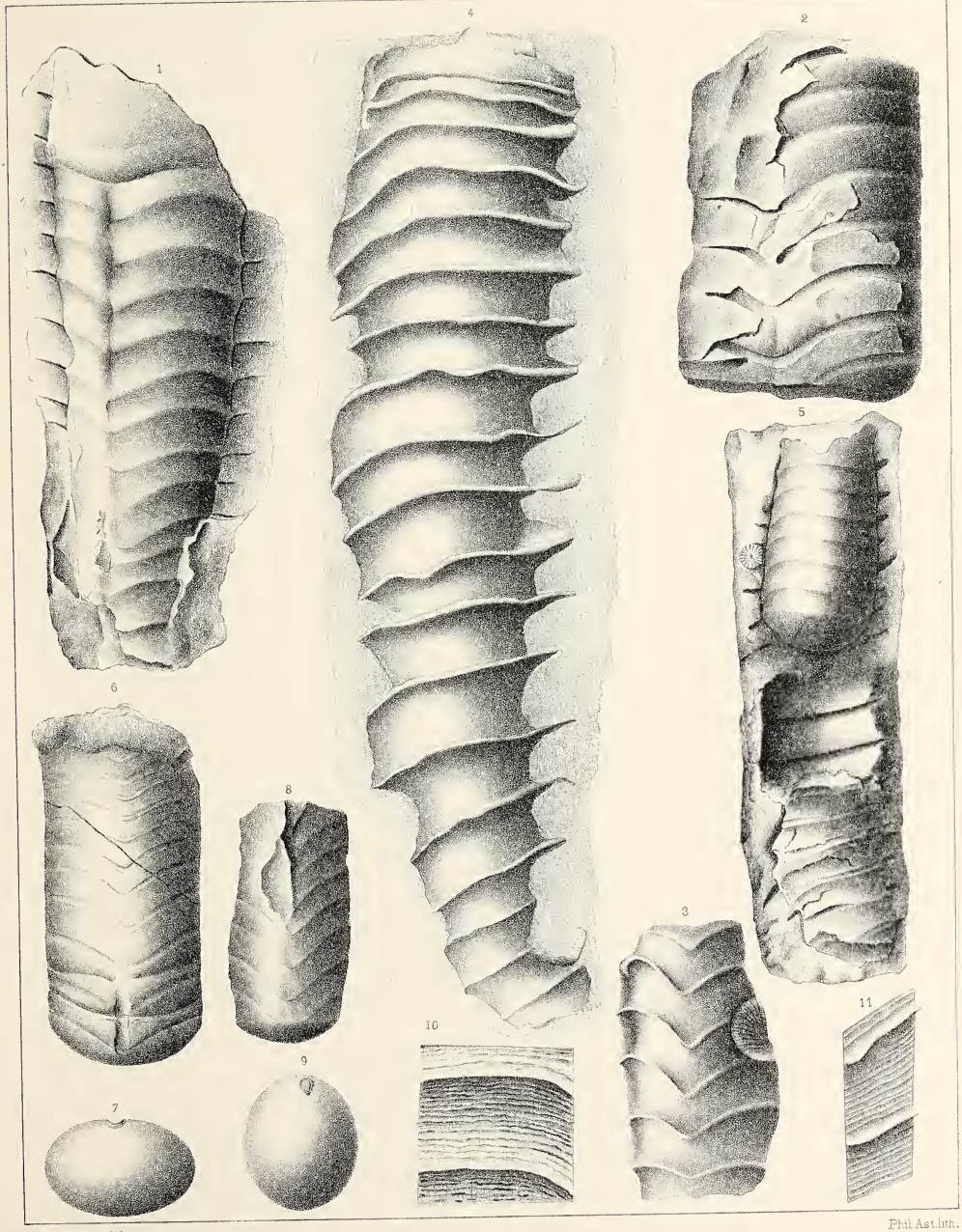
Fig. 9. The septum of the preceding, showing the position of the siphuncle and the amount of the compression.

Fig. 10. An enlargement of the surface, showing the fine lamellose lines of growth and the traces of longitudinal striæ.

Fig. 11. An enlargement of the surface and ornaments, taken from a gutta-percha mould of the impression made by the solution of the test in process of weathering.

The specimens of this species here illustrated are from the Schoharie grit, in the counties of *Albany and Schoharie, N. Y.*

Schoharie Grit.
(CYRTOCERATIDÆ.)



G.B.Simpson del

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PLATE XCVII.

CYRTOCERAS ÆMULUM.

Page 371.

See Plate 98.

Fig. 1. Lateral view of a compressed fragment, showing the curvature of the tube and the irregular annulations of the internal mould, corresponding to the external ornaments of the test. Schoharie grit. *Schoharie, N. Y.*

Fig. 2. A larger portion of an individual, showing the irregularity of the annulations on the internal mould and the curvature of the outer portion of the tube. Schoharie grit. *Schoharie, N. Y.*

Fig. 3. The apical portion of an individual, showing the curvature of the tube toward the apex, and the extension of the lamellose expansions of the test into the surrounding rock. Schoharie grit. *Clarksville, N. Y.*

Fig. 4. A small septate fragment, showing the depth of the air-chambers and the concavity of the septa. Schoharie grit. *Schoharie, N. Y.*

Fig. 5. A septum of the preceding, showing the amount and direction of compression to which the tube has been subjected, and the position of the siphuncle.

Fig. 6. An imperfect fragment, showing the curvature of the tube and the depth of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Fig. 7. A septum of the preceding, showing the transverse section of the tube.

Fig. 8. Lateral view of a chambered fragment, showing the relations of the suture-lines and the annulations of the internal mould, and the regularity of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Fig. 9. A septum of the preceding, showing compression in a direction oblique to the ventro-dorsal axis.

The specimens figs. 4, 6 and 8 are referred to this species, as agreeing in the amount of curvature, apical angle, and the depth of the air-chambers, but possessing few other distinctive features.

CYRTOCERAS EUGENIUM.

Page 369.

See Plates 36, 47, 96.

Fig. 10. A fragment retaining a portion of the chamber of habitation and several attached air-chambers. Schoharie grit. *Schoharie, N. Y.*

Fig. 11. A septum of the preceding, showing the transverse section and the position of the siphuncle.

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PLATE XCVIII.

Gyroceras spinosum.

Page 382.

See Plates 47, 48, 49, 99.

Fig. 1. Ventral view of a fragment preserving its natural form, showing the characters of the sinus in the striæ, and the rounded, revolving ridges on each side, formed by the rows of spines. Schoharie grit. *Clarksville, N. Y.*

Fig. 2 *id.* Lateral view, showing one and remains of another revolving ridge, corresponding to the lateral rows of spines.

Fig. 5. View of a gutta-percha mould, taken from the weathered lateral impression of a specimen, showing the frequency and prominence of the spines. Schoharie grit. *Schoharie, N. Y.*

Fig. 6. An enlargement of the surface of a fragment, showing the undulating, lamellose lines of growth.

Fig. 7. A fragment preserving its natural form, and retaining portions of the test adhering to the internal mould, showing the curvature and enlargement of the tube and the bases of the tubular expansions of the test. Schoharie grit. *Schoharie, N. Y.*

Cyrtoceras æmulum.

Page 371.

See Plate 97.

Fig. 3. Lateral view of the specimen, with the apical portion imbedded in the surrounding matrix, showing the form and curvature of the tube and the lamellæ of the test, which are seen extending into the surrounding rock. Upper Helderberg limestone. *Pendleton, Ind.*

Fig. 4. Ventral view of the chamber of habitation of the preceding, showing the sinus in the aperture and ornaments of the test. The exfoliation of the test shows the interior filled with a deposit of crystalline material.

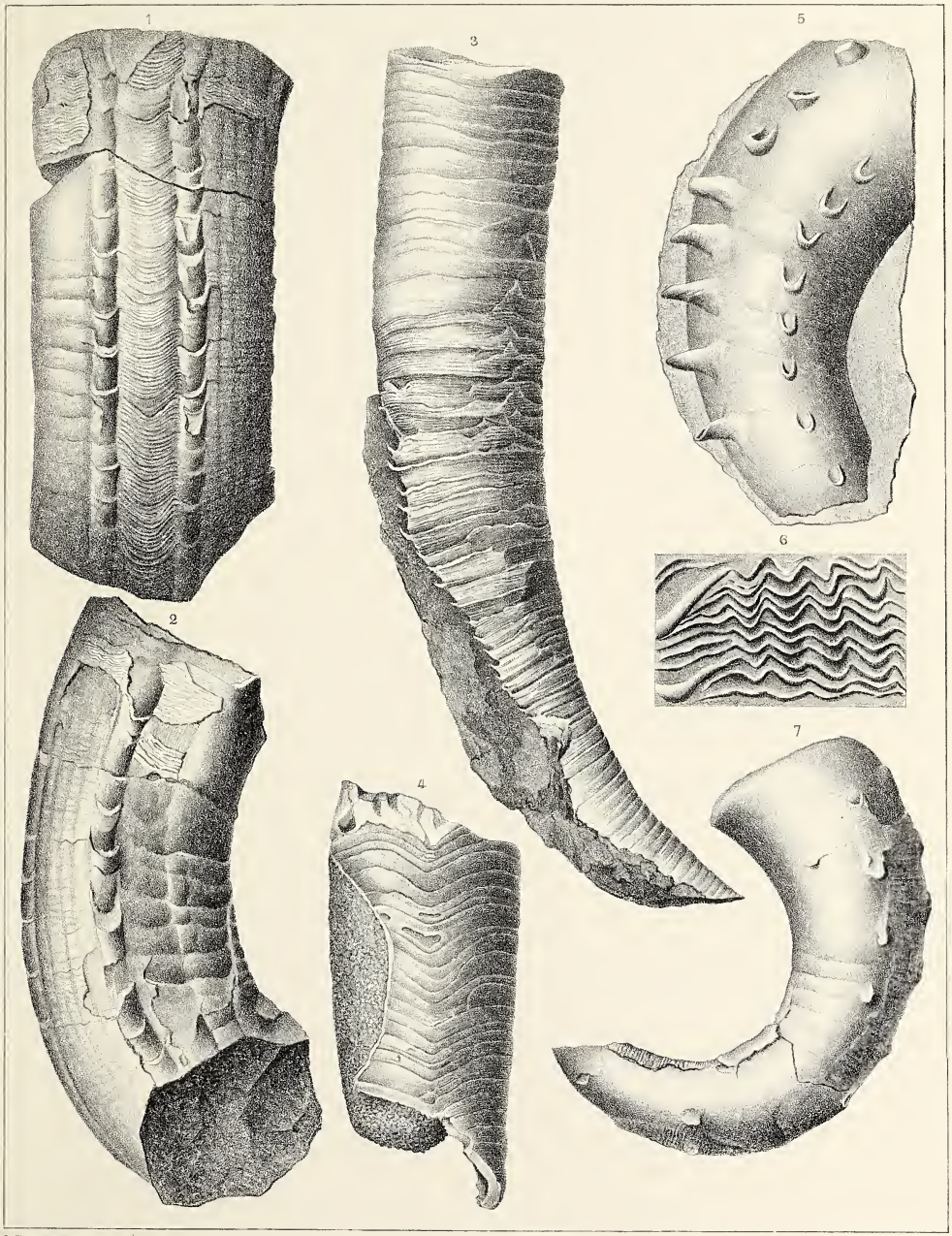
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PLATE XCIX.

GYROCERAS SPINOSUM.

Page 382.

See Plates 47, 48, 49, 98.

Fig. 1. Lateral view of a compressed specimen, preserving the chamber of habitation and about thirty air-chambers, showing the curvature of the tube and the increase in the depth of the air-chambers from the apex to the grand chamber. The internal mould shows the bases of two lateral rows of semi-tubular spines.

Fig. 2 *id.* A gutta-percha impression of the matrix, showing the characters of the surface ornamentation more clearly than is preserved on the internal cast. Toward the aperture the tube is ornamented by transverse expansions of the test, with the bases of the spines preserved as sinuosities of the margins.

Fig. 3. Ventral view of two air-chambers, showing portions of the siphuncle exposed in the process of weathering.

Fig. 4. A small chambered fragment, showing the siphuncle as in the preceding.

Fig. 5 *id.* A septum showing the position of the siphuncle and the transverse section of the tube, which has been disturbed by compression.

Fig. 6. The chamber of habitation of a small individual associated with this species, showing its proportions and the concavity of the last septum.

Fig. 7 *id.* The septum, showing the position of the siphuncle and the transverse section of the tube, slightly disturbed by compression.

Fig. 8. The septum, at the base of a large chamber of habitation, showing the transverse section of the tube. This specimen and the preceding are referred with some doubt to this species, as they do not possess distinctive characters.

The specimens here figured are from the Schoharie grit, at *Schoharie, N. Y.*

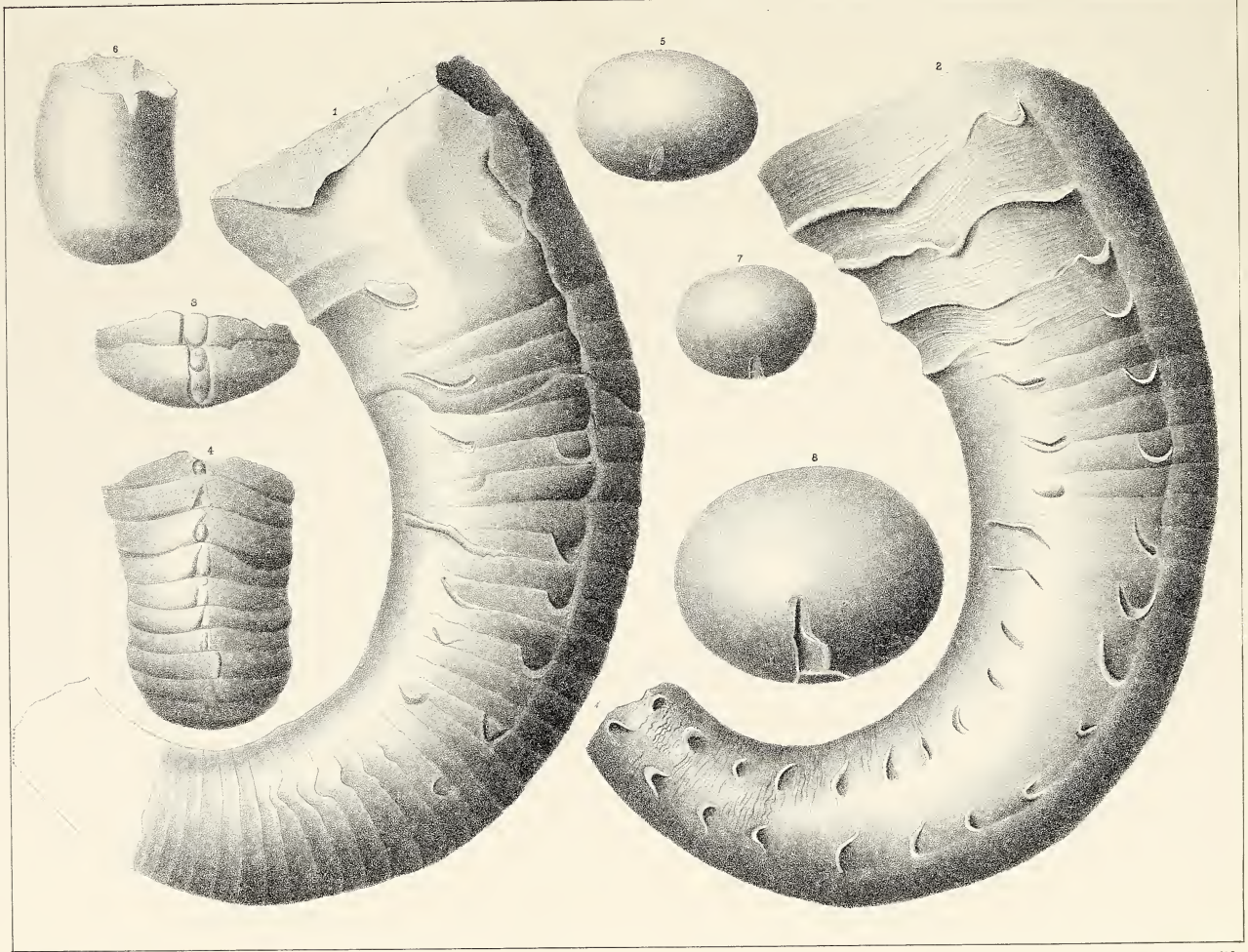
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PLATE C.

GYROCERAS VALIDUM.

Page 385.

See Plate 49.

Fig. 1. Lateral view of an individual preserving nearly its natural form; showing the curvature and enlargement of the tube, and the gradual increase in the depth of the air-chambers, from the apex toward the grand chamber. The direction of the chamber of habitation is outward from the spiral in a direction tangent to the curve. At the aperture the tube is slightly expanded. Schoharie grit. *Albany county, N. Y.*

G.B.Simpson del. J.Bien, mann lith.

PLATE CI.

GYROCERAS CYCLOPS.

Page 387.

See Plates 102, 103, 104.

Lateral view of an individual imperfect at the apex, showing the size and curvature of the tube, with the transverse annulations on the internal mould corresponding to the ornaments of the test. A slight expansion of the tube is shown at the aperture, and on the ventral side of the apical portion the revolving ridges formed by the plications of the foliate expansions of the test. Upper Helderberg limestone. *Clarksville, N. Y.*

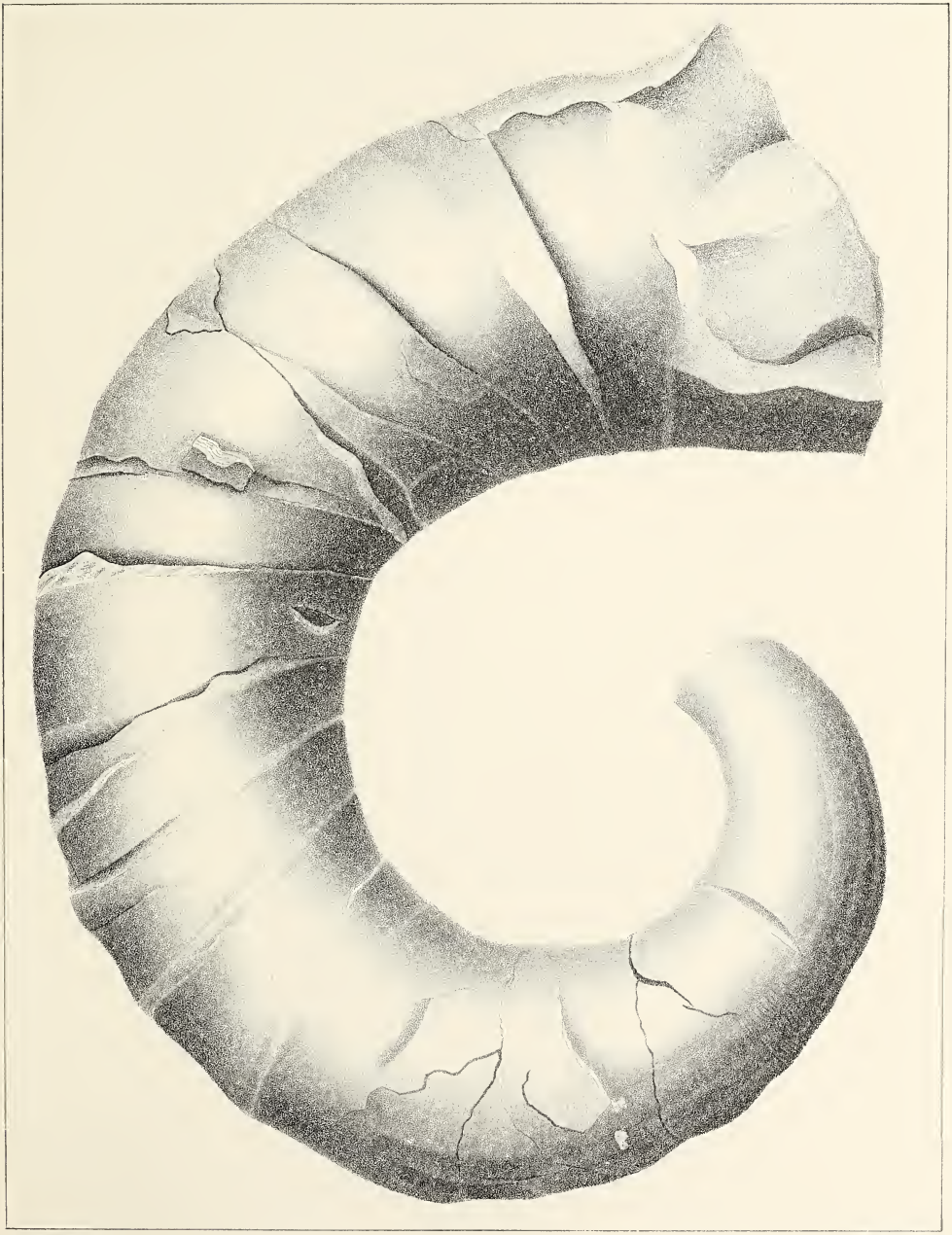


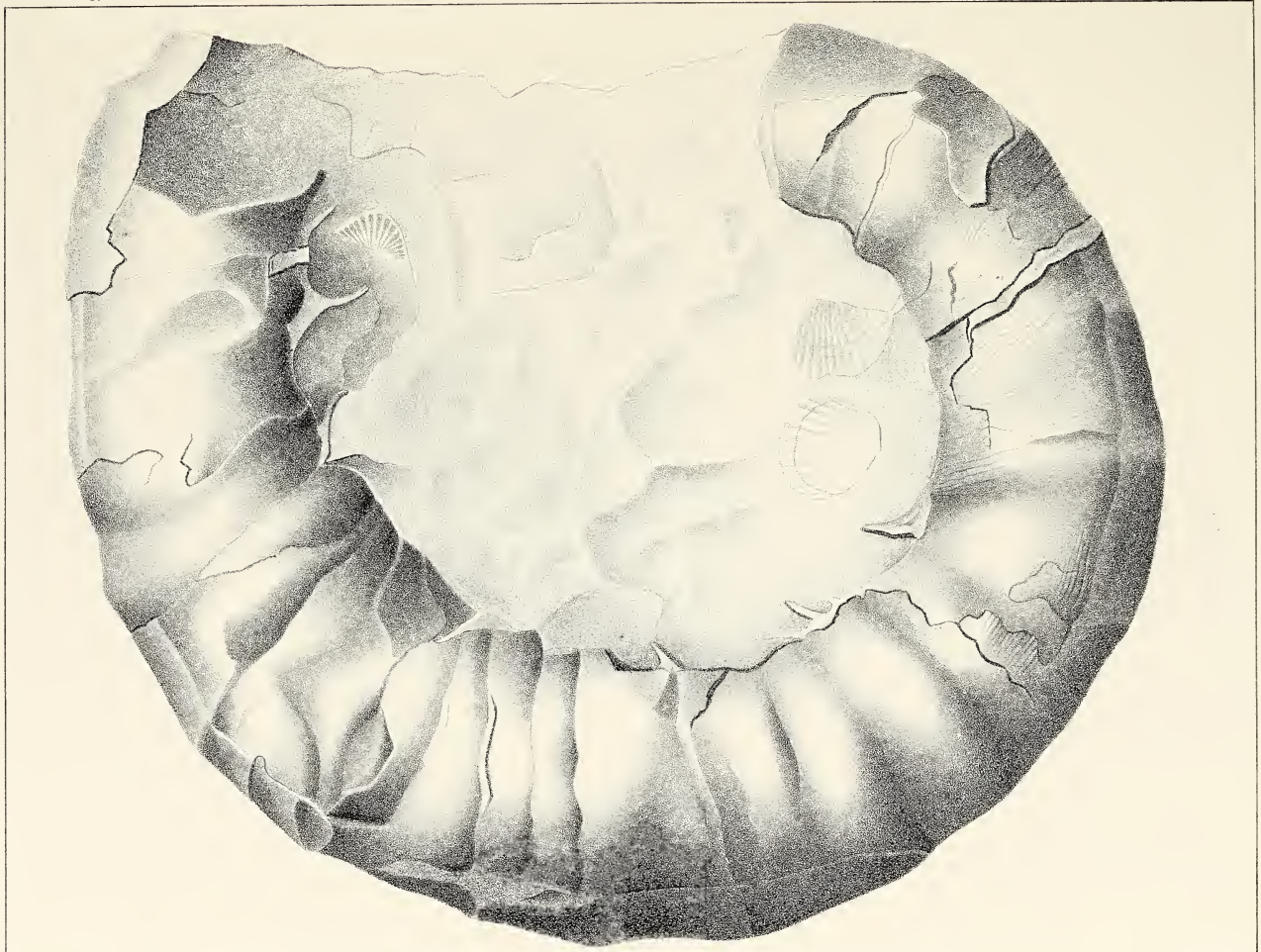
PLATE CII.

GYROCERAS CYCLOPS.

Page 387.

See Plates 101, 103, 104.

Lateral view of an imperfect specimen, showing the curvature of the tube and the annulations of the internal mould. Several of the foliate expansions of the test are represented extending from the concave dorsal side into the surrounding matrix. Upper Helderberg limestone. *Helderberg mountains, N. Y.*



G.B.Simpson del.

P.Riemann lith.

PLATE CIII.

Gyroceras Cyclops.

Page 387.

See Plates 101, 102, 104.

Fig. 1. A fragment, showing the transverse section of the tube and one of the foliate expansions of the test, with its surface-markings and the strong plications of the margin, which are more subdued at the base and along the walls of the tube. Upper Helderberg limestone. *Columbus, Ohio.*

Fig. 2 *id.* Lateral view, showing the surface-markings on the tube and the inclination and extension of the transverse expansions.

Gyroceras Eryx.

Page 386.

See Plate 58.

Fig. 3. Lateral view of a large individual, showing the size and curvature of the shell. Some of the septa are preserved, and show the regular depth of the air-chambers and the straight septal sutures at right angles to the spiral axis of the tube. Magnesian limestones of the Hamilton group. Near *Milwaukee, Wis.*

Gyroceras, sp. indet.

Fig. 4. A fragment found in the same association with *G. Eryx*, but of undetermined specific relations. The figure is a ventral view, and shows traces of the siphuncle exposed in the process of weathering. Magnesian limestones of the Hamilton group. Near *Milwaukee, Wis.*

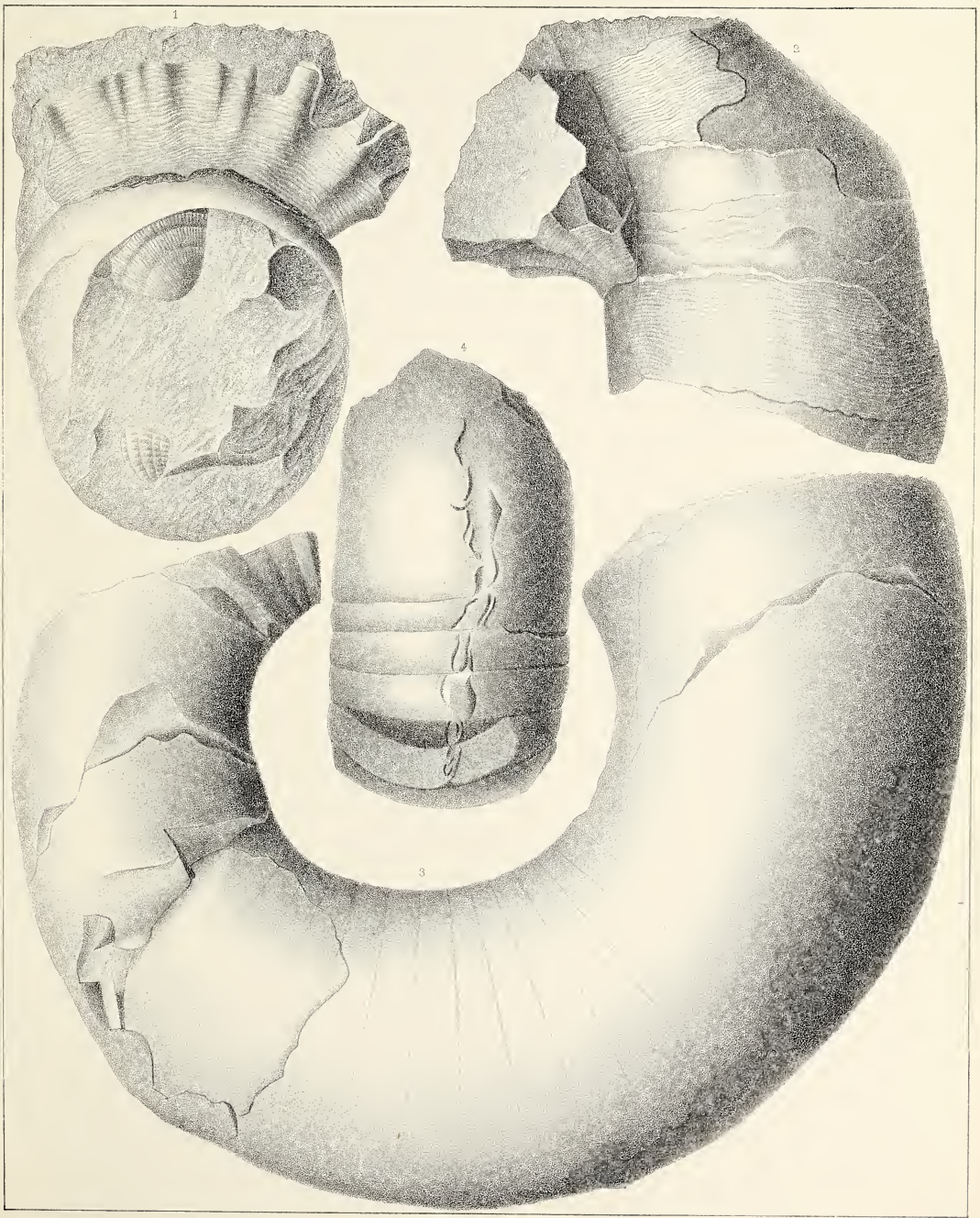

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PLATE CIV.

GYROCERAS CYCLOPS.

Page 387.

See Plates 101, 102, 103.

Fig. 1. Lateral view of a large, nearly entire individual, preserving the test on some portions of the surface, and showing the lamellose expansions extending into the matrix on the concave dorsal side.

Fig. 2. A transverse section of another individual, showing the convex side of the septum and the position of the siphuncle.

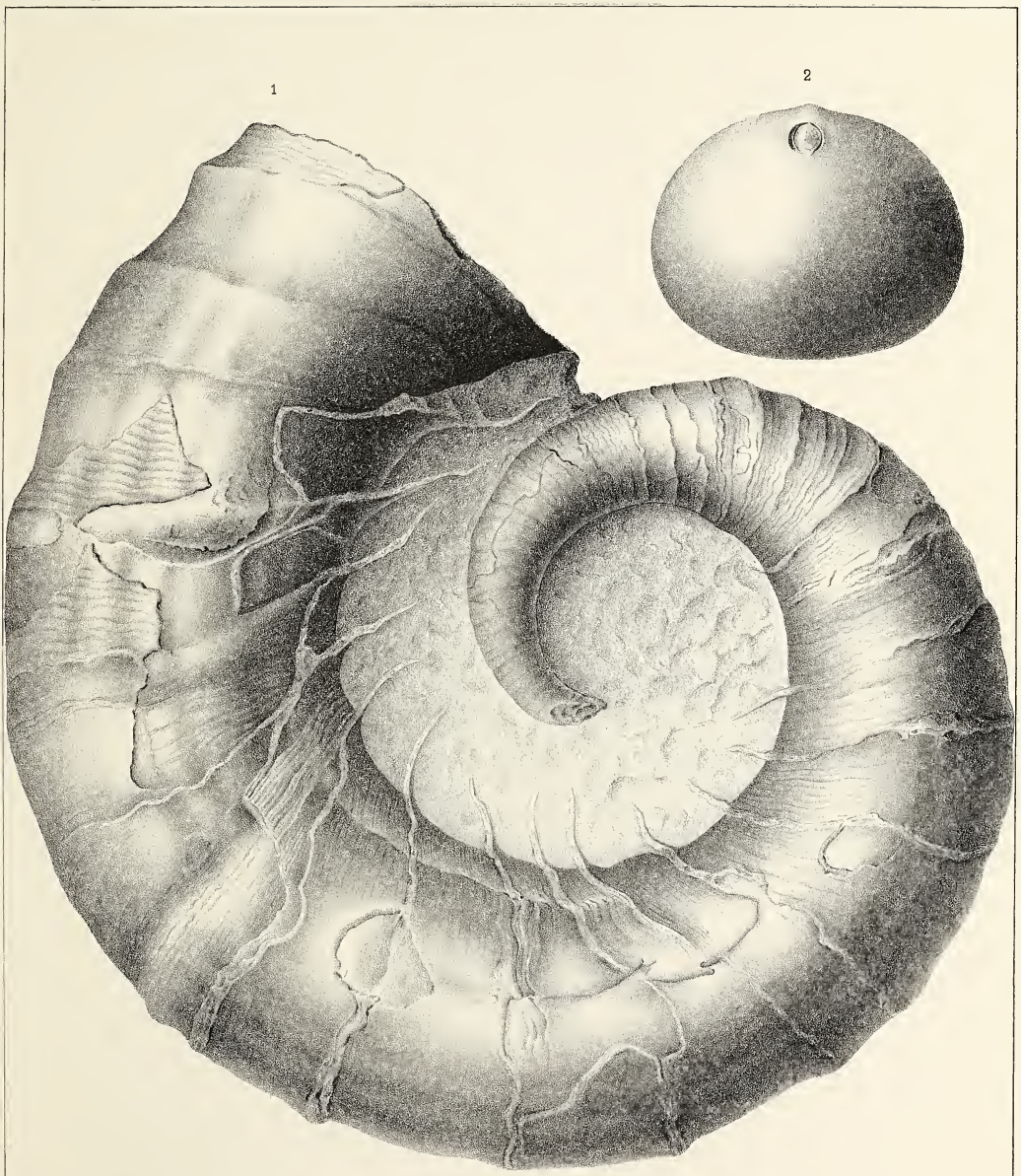
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PLATE CV.

NAUTILUS MAGISTER.

Page 422.

See Plates 62, 107, 108.

Fig. 1. A fragment, preserving two of the air-chambers near the base of the grand chamber, with one of the smaller ones at the distance of half a volution; the impressions of the intervening air-chambers and septa being marked upon the adhering matrix, showing the re-entrant character of the volutions and the sinus in the septa on the dorsal side. The comparative diameter of the two volutions, as presented in the fragment, are about as 65–115. The convex surface of the larger air-chamber is flattened and distorted from compression and weathering, which obscures the siphuncle: from the same cause the concavity of the dorsal side of the large chambers has been partially obliterated, as shown in the outline of the figure.

The specimen is referred with some hesitation to *N. magister;* but the proportions of the parts are essentially the same as in typical specimens of that species, and it is quite distinct from any other form. Lower part of the Hamilton group. Near *Leonardsville, Madison county, N. Y.*

NAUTILUS ORIENS.

Page 420.

See Plate 61, 106.

The ventral side of a compressed and imperfect chamber of habitation, with several air-chambers at the base. The shell is partially preserved on one side, showing the transverse lamellose striæ, and the impression of the same on the other side, which is exfoliated, showing numerous plumose, branching Bryozoans which have adhered to the inner surface of the shell. From the Marcellus shale. Near *Richmondville, Schoharie county, N. Y.*

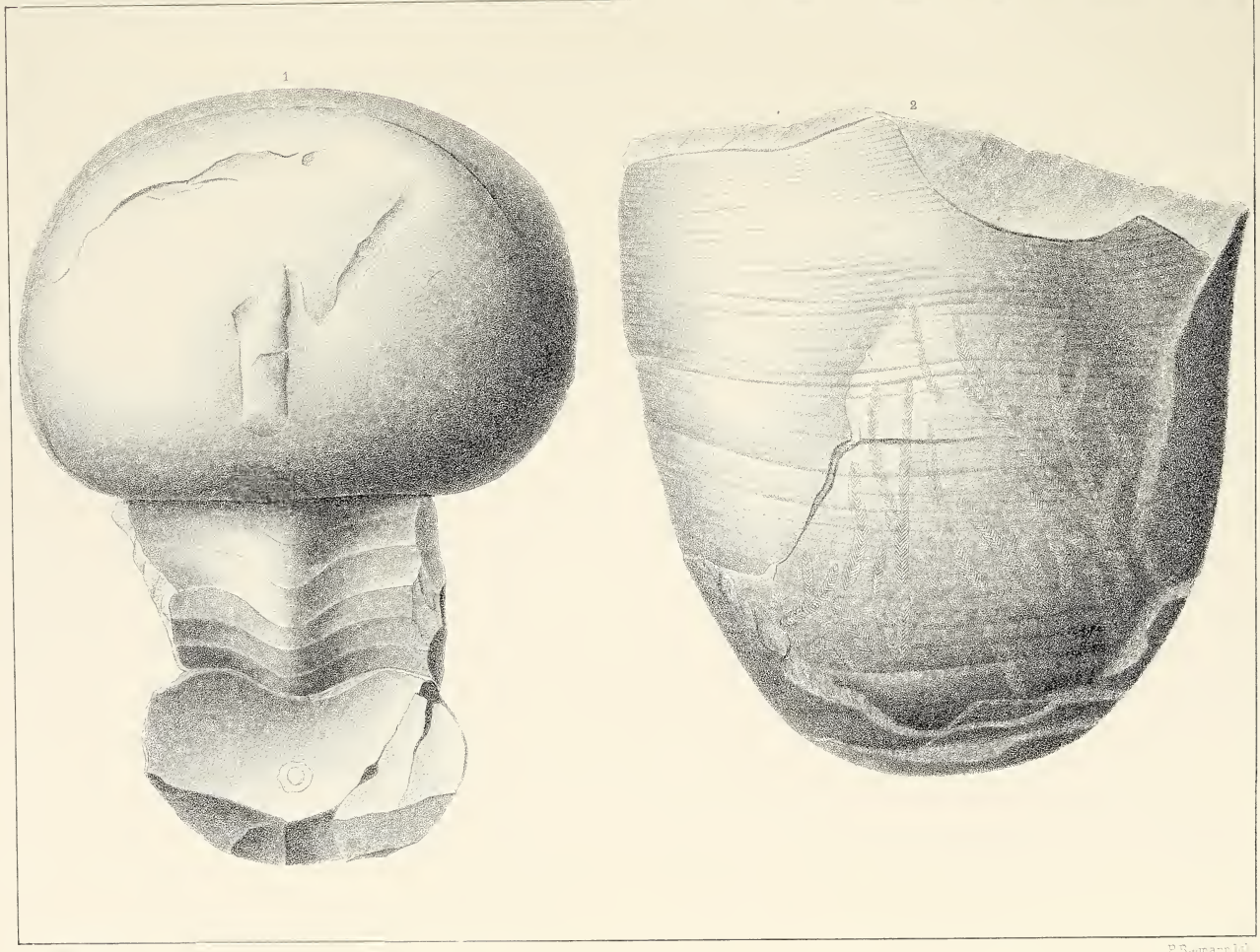
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PLATE CVI.

Nautilus cavus.

Page 416.

Fig. 1. The concave dorsal side of a part of the outer chambered volution, showing the impression and the sinuosities in the septa, caused by the re-entrant volution.

Fig. 2. The ventral side of the specimen, showing the great depth of the air-chambers.

Fig. 3. Lateral view of the same, the open umbilicus and the curvature of the volution. From the shales of the Hamilton group. Near *Cumberland, Md.*

Nautilus bucinum.

Page 412.

See Plates 60, 107, 109.

Fig. 4. A lateral view of an imperfect specimen which has been partially crushed somewhat obliquely in a dorso-ventral direction.

Fig. 5. The ventral side of the preceding specimen, showing the lateral expansion of the chamber of habitation and adjacent air-chambers. The surface is partially covered by a tubular parasite. *Cazenovia, N. Y.*

Fig. 6. The ventral side of a specimen which preserves nearly its natural proportion, showing the deep and gradually expanding chamber of habitation. The shell is partially preserved in a macerated condition, and is marked by the impressions of branching tubular Bryozoans. The opposite side of the same specimen is shown on plate 58, figure 4. *Solsville, Madison county, N. Y.*

Fig. 7. A longitudinal section of a small specimen, which shows the depth of the outer chamber, with the character and concavity of the attached air-chambers. Quarries north of *Sherburne, Chenango county, N. Y.*

Nautilus oriens.

Page 420.

See Plates 61, 105.

Fig. 8. A lateral view of a young or medium-sized specimen, showing the principal part of the chamber of habitation, the depth of the air-chambers and the deep umbilicus. From the Marcellus shales. Near *Richmondville, Schoharie county, N. Y.*

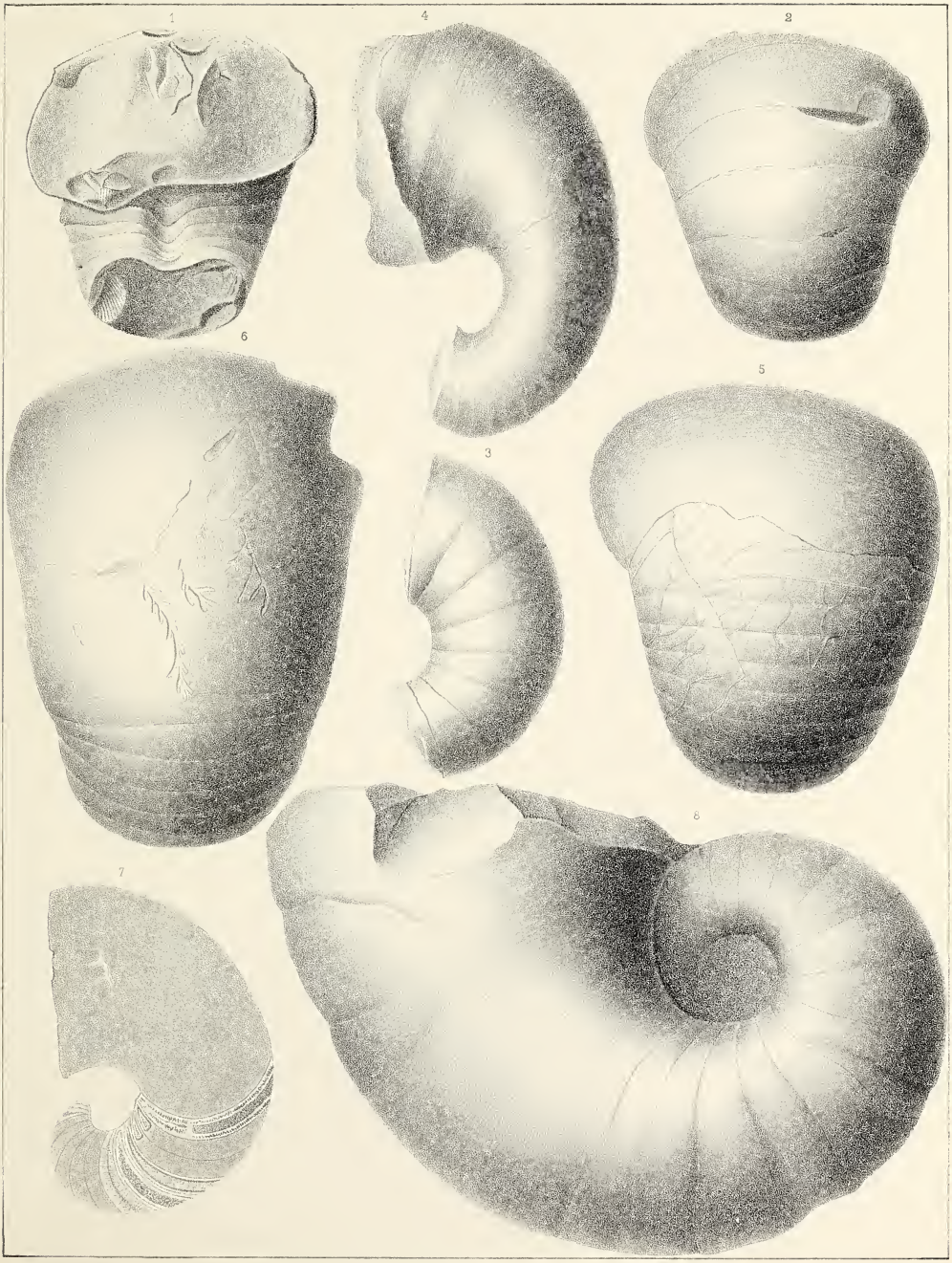
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PLATE CVII.

Nautilus magister.

Page 422.

See Plates 62, 105, 108.

Fig. 1. The convex side of a septum of a large individual, showing the elliptical form with the broad sinus on the dorsal side, and the siphuncle with the surrounding areola.

Fig. 6. A fragment preserving the apical portions of the volutions, showing the fractured margins of the air-chambers from exfoliation, and the deep umbilicus.

Fig. 7. A fragment of one of the small inner volutions, showing the form and proportions of the siphuncle, in its passage through the air-chambers, and its constriction at the septa.

Fig. 8. A longitudinal section of the smaller part of the outer volution, with a part of the inner volution, showing the depth of air-chambers, the form and proportions of the siphuncle, etc. The figure is incomplete in the upper convex portion, the septa and chamber filling having been broken away, and the outline is not continued. The specimens are all from the Hamilton group. Town of *Hamburgh, Erie county, N. Y.*

Nautilus bucinum.

Page 412.

See Plates 60, 106, 109.

Fig. 2. A fragment preserving four air-chambers and the base of the grand chamber.

Fig. 3. A septum showing the form of the transverse section and the position of the siphuncle. From the decomposing semi-calcareous shales of the Hamilton group, at *Pratt's Falls, Onondaga county, N. Y.*

Fig. 4. A fragment preserving a part of the chamber of habitation with several attached air-chambers. The test is partially preserved, and the fine cancellating striæ are well defined.

Fig. 5. An enlargement of the surface of figure 4, showing the character of the surface-markings of the shell. From the shales of the Hamilton group on the *east shore of Cayuga lake, N. Y.*

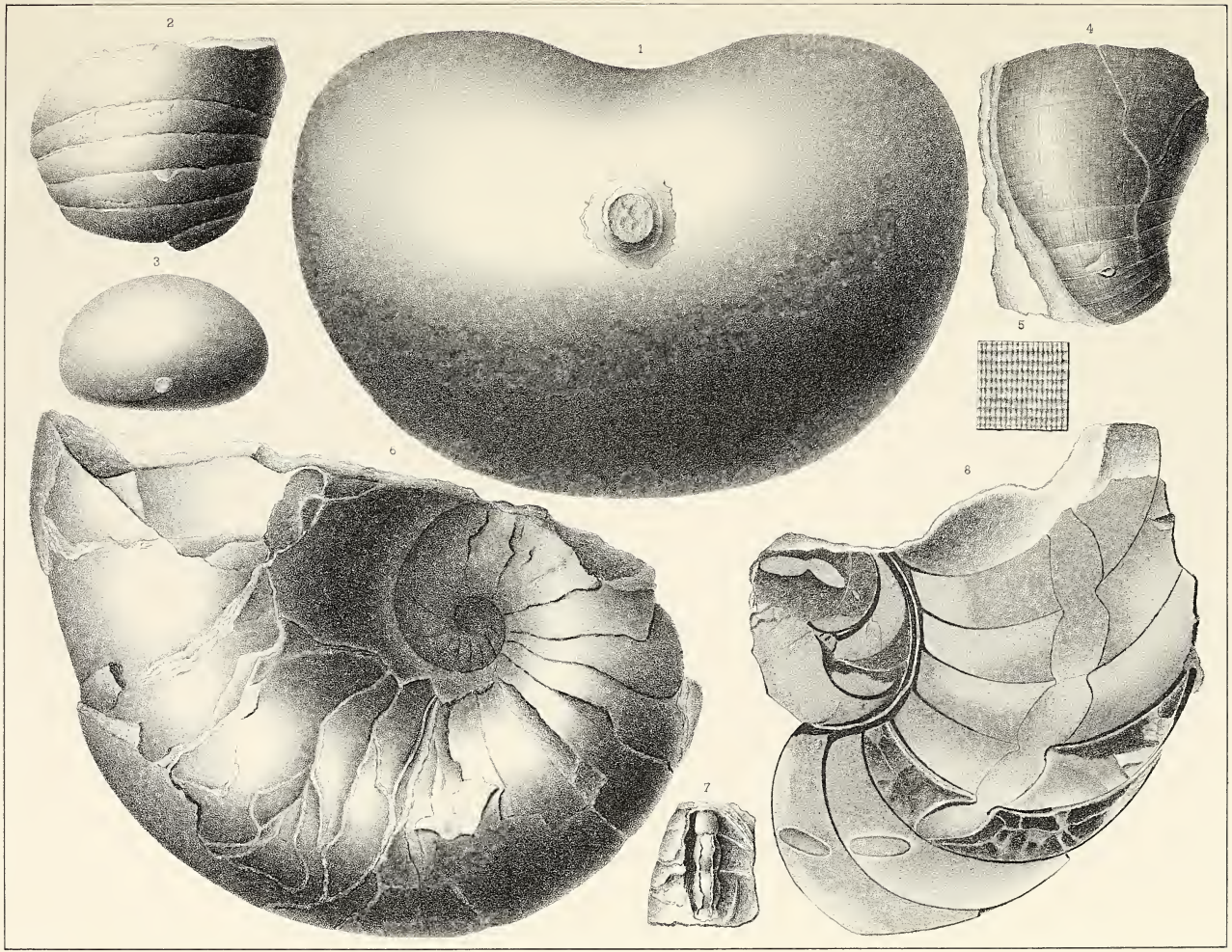

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PLATE CVIII.

NAUTILUS MAGISTER.

Page 422.

See Plates 62, 105, 107.

Fig. 1. A lateral view of a nearly entire individual of this species. The septa and filling of the air-chambers are much broken at the margins, and the outer margin of the grand chamber is everywhere incomplete.

Fig. 2. A posterior view of the same specimen looking upon the ventral side of the air-chambers, and showing the great width of the chamber of habitation. *Hamburgh, Erie county, N. Y.*

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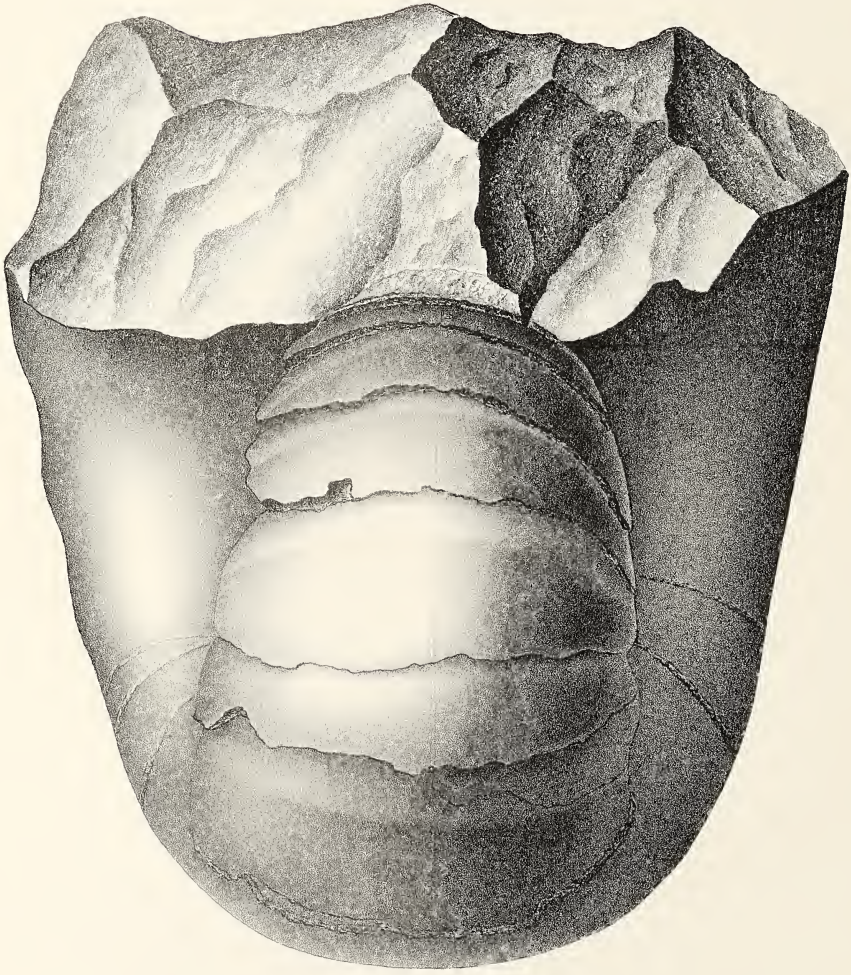

Compositor

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PLATE CIX.

Nautilus bucinum.

Page 412.

See Plates 60, 106, 107.

Fig. 1. A ventral view of the grand chamber of a young shell, preserving the surface ornamentation in a remarkable degree of perfection. The sharp, elevated, revolving striæ, with finer intermediate transverse striæ, are precisely of the character of those on the surface of the specimen of this species from the Goniatite limestone, plate 60, figs. 1–3.

This surface-marking resembles that of the specimen referred to *N. liratus*, var. *juvenis*, figs. 5 and 6, pl. 56, but the revolving striæ are more closely arranged and less conspicuous on the concave side, while the tube is free from any transverse undulations which mark that variety. *West shore of Canandaigua lake, N. Y.*

Fig. 2. A fragment preserving the chamber of habitation nearly entire and two attached air-chambers. The surface is marked by the undulating striæ of growth and very fine revolving striæ. On the concave side of the specimen the revolving striæ are about one mm. distant from each other; and on the convex side there are stronger striæ of about the same or a greater distance apart, between which are finer striæ. From the arenaceous shales of the Hamilton group. Near *Cazenovia, N. Y.*

Fig. 6. An enlargement from the dorso-lateral surface of a specimen of this species, showing the distant revolving striæ and the finer concentric striæ. From the dark colored shales. *Shore of Cayuga Lake, N. Y.*

Nautilus acræus.

Page 417.

Fig. 3. The ventral side of the chamber of habitation, showing the form (which is slightly compressed), and the fine equal striæ of the surface.

Fig. 4. The concave dorsal side, showing the form of the transverse section, the position of the siphuncle, and the fine surface-markings. There is a slight indentation near the upper fractured edge of the shell, which has apparently been produced by the contact of the inner volution.

Fig. 5. An enlargement of the surface, showing the fine, nearly equal striæ, of which there are from twelve to fifteen in the space of five mm. In the arenaceous shales of the Hamilton group. *Plainfield, Otsego county, N. Y.*

Goniatites Vanuxemi.

Page 434.

See Plates 66, 67, 68, 69, 74, 109.

Fig. 7. A transverse section of the disc, showing the form of the inner volutions, their gradually increasing dorso-ventral diameter, and final form in the grand chamber near the aperture.

Fig. 8. A portion of the periphery of a large individual of the species, showing the deep sinuosity in the striæ, and their great thickness and imbricating character upon the angles of the periphery. From the Goniatite limestone. *Manlius, N. Y.*

Nautilus (Discites) Marcellensis.

Page 428.

See Plate 65.

Fig. 9. A small individual of this species, which is principally a cast of the interior, preserving the shell upon a part of the grand chamber, which should have been represented as broken along the peripheral angle. *Manlius, N. Y.*

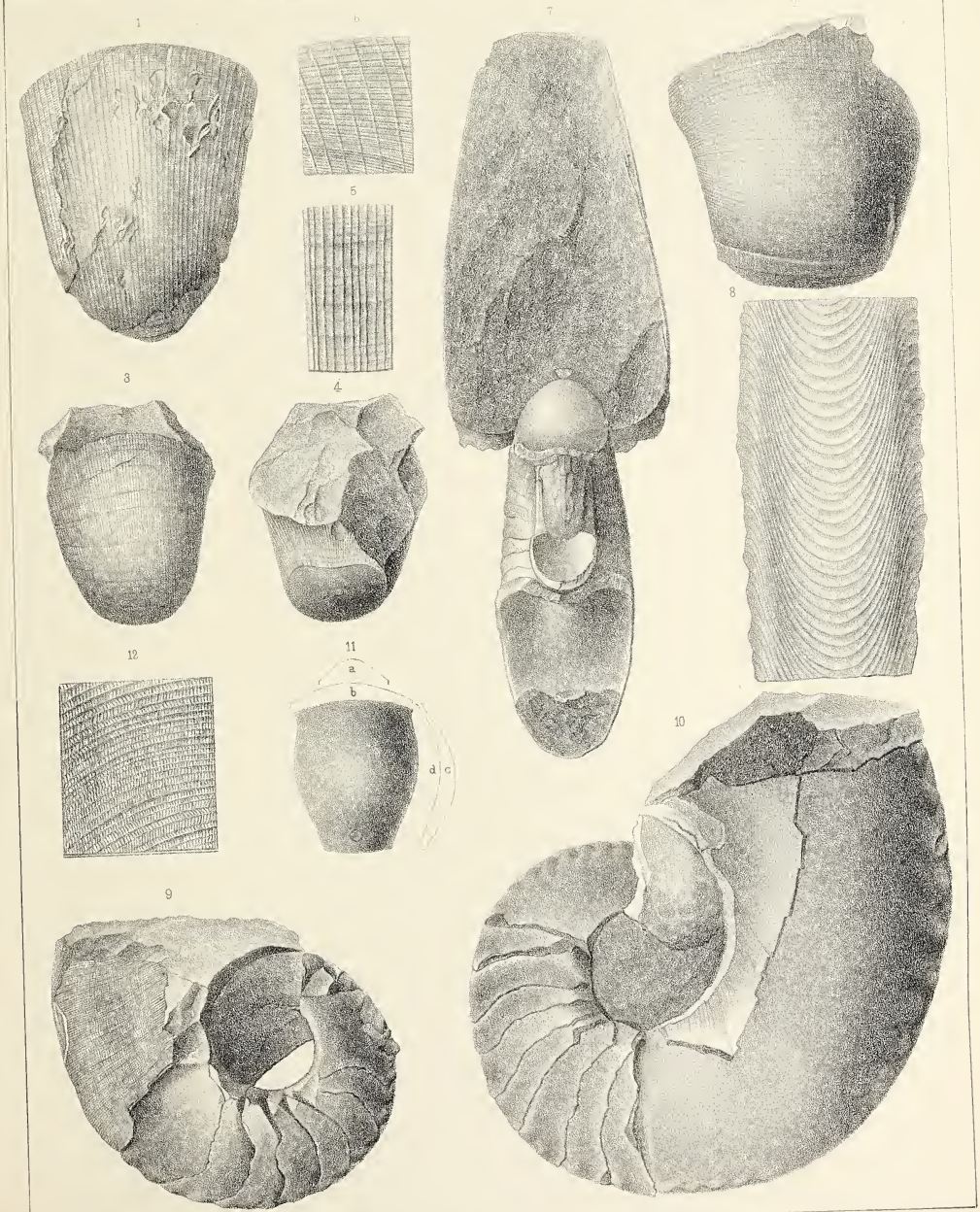
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PLATE CIX.—*Continued.*

Fig. 10. A lateral view of the cast of a specimen. The adhering shell preserves only the transverse striæ of growth in a nearly obsolete condition. This is the typical specimen of the species described by Mr. VANUXEM. It was originally nearly covered and inclosed in the grand chamber of a large individual of *Goniatites Vanuxemi*. This condition of the specimen was doubtless the source of the error which led to regarding this one as the larger and "more abundant" form, while it never reaches one-half the size of *G. Vanuxemi*, and is far less numerous in individuals. *Manlius, N. Y.*

Fig. 11. A transverse section of a volution, showing the position of the siphuncle, form, etc. The sides are more convex than usual, and the carinations at the umbilical angles are a little too attenuate—being stronger in the original.

Fig. 12. An enlargement of the surface, showing the continuous transverse striæ and the interrupted revolving striæ, as appearing on the surface of the specimen fig. 9.

PLATE CX.

Nautilus (Discites) inopinatus.

Page 426.

Fig. 1. A lateral view of the specimen, showing the wide umbilicus, the form of the volutions, and the rows of nodes upon the umbilical and peripheral margins. The surface is obscured by adhering Stromatopora.

Fig. 2. The ventral side of the specimen, which preserves a part of the shell, obscurely showing the surface-markings. Near *Sandusky, Ohio.*

Goniatites plebeiformis.

Page 448.

See Plate 16.

Fig. 3. A young specimen preserving the chamber of habitation only, the inner volutions having been dissolved by iron pyrites.

Fig. 4. A larger specimen, the form and proportions being given from a gutta-percha cast in a natural mould of the fossil. The impressions of the nodes have been only partially preserved.

Fig. 5. The outer volution of a large specimen preserving only the grand chamber; the septate portion having been removed by the action of iron pyrites.

Fig. 6. The ventral side of an interior volution, showing the course of the septa and the angular re-entrant lobe.

Fig. 7. A section of a specimen of the prevailing size and proportions, showing the depth of the chamber of habitation, terminated with the last septum of the chambered portion of the shell. The inner volutions have all disappeared, and the space is occupied by calcareous matter filled with Styliola and Tentaculites.

Fig. 8. A section of a specimen, cut in the direction of the spire, preserving the grand chamber and a small part of one of the chambered volutions. The remaining portion of the cavity is filled with limestone containing Styliola.

Fig. 9. A section of a specimen cut vertically through the spire and the adhering limestone. The section of the outer volution is preserved, as shown in the figure, while the inner turns have been dismembered and displaced, as shown by the small semi-elliptical sections preserved in the central portion of the figure. The septate portions of the volutions are rarely preserved. *Cherry Valley, N. Y.*

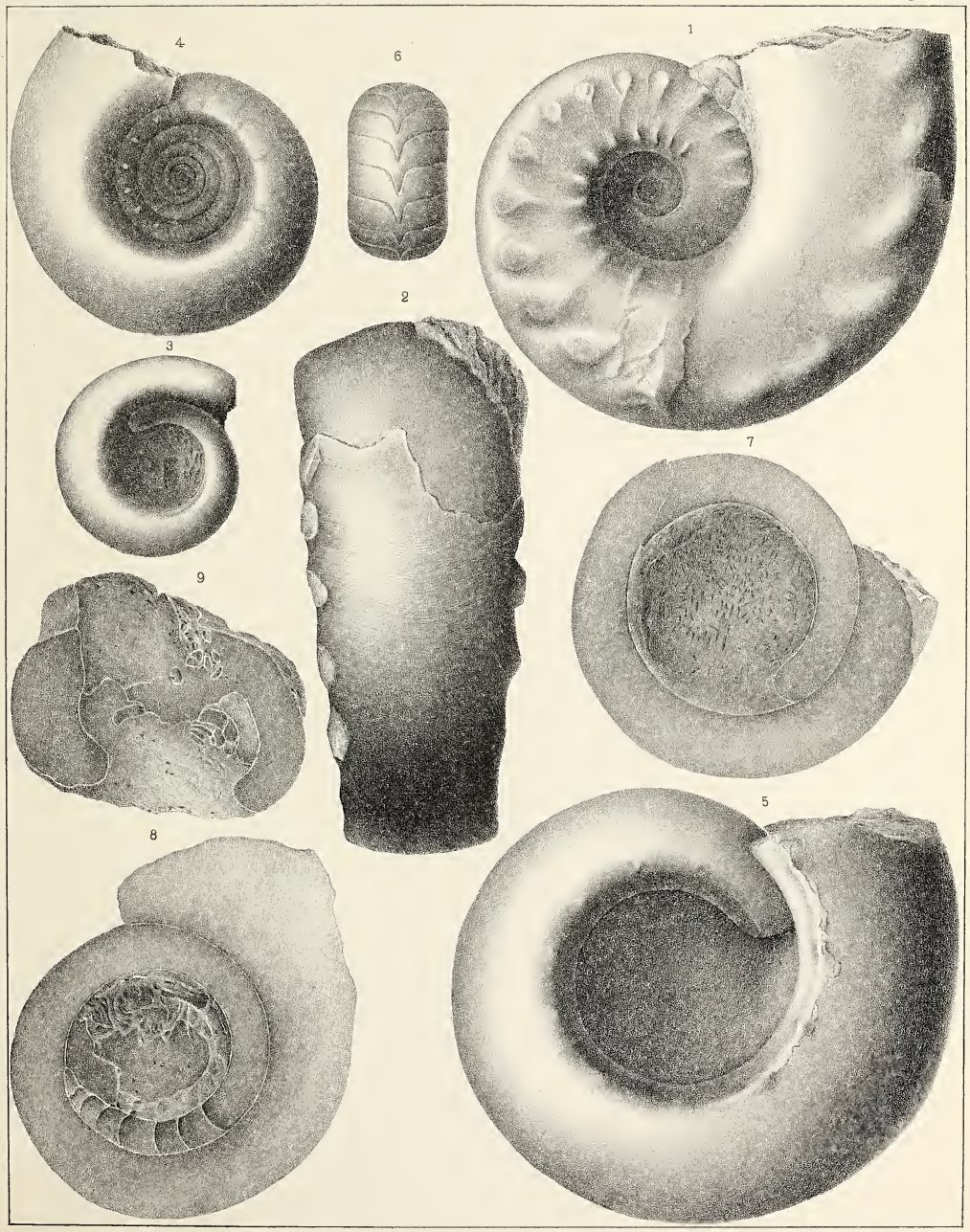
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PLATE CXI.

Trochoceras obliquatum.

Page 401.

See Plate 58.

Fig. 1. Upper lateral view of a fragment, showing the curvature of the tube and the depth of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Fig. 2. A septum of the preceding, showing the transverse section of the tube and the position of the siphuncle.

Trochoceras Pandion.

Page 400.

See Plate 58.

Fig. 3. Lateral view of a septate fragment, showing the curvature of the tube, the depth of the air-chambers, and some traces of the furrows of the crenulations continued over the internal mould of the walls of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Gonioceras? pandum.

Page 403.

Fig. 4. A fragment imbedded in the surrounding rock, showing one of the angles of the tube, the variation in the depth of the air-chambers, and the curvature of the sutures over the broad, flat faces of the tube. Schoharie grit. *Schoharie, N. Y.*

Trochoceras expansum.

Page 402.

See Plate 58.

Fig. 5. Dorsal view of a portion of a small individual, showing the form of the shell and the transverse section of the tube, with the siphuncle on the convex ventral side. The slight departure from a symmetrical coil, and its nautiloid character, are also indicated. Schoharie grit. *Schoharie, N. Y.*

Trochoceras Clio.

Page 392.

See Plate 59.

Fig. 6. The upper side of a small individual, showing oblique annulations, with the septa at right angles to the spiral axis, and crossing the annulations. Schoharie grit. *Schoharie, N. Y.*

Trochoceras Biton.

Page 395.

Fig. 7. A fragment showing the curvature of the tube, and the linear nodes which are prominent on the concave dorsal side, and extend as rounded, transverse undulations to the convex ventral side. The surface-markings are preserved over a small portion of the tube, and show as strong longitudinal striæ. Schoharie grit. *Clarksville, N. Y.*

Trochoceras Barrandei.

Page 393.

Fig. 8. The siphuncle of a specimen which has broken longitudinally along the ventral line, and exposed the siphuncular tube, showing the amount of its expansion in the cavities of the air-chambers, and the striations of its surface at the constrictions where it passes through the septa. Schoharie grit. *Clarksville, N. Y.*

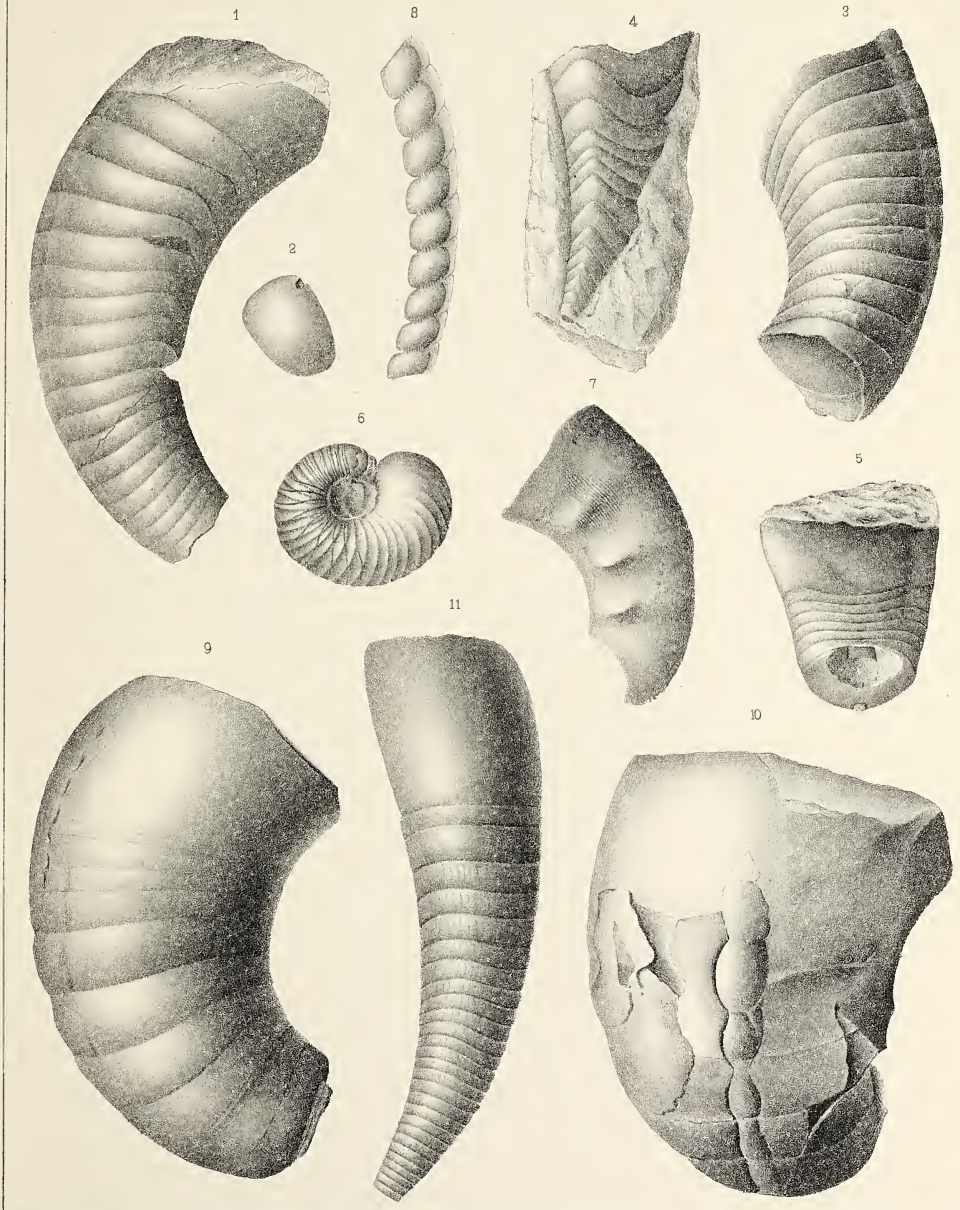
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PLATE CXI.—*Continued.*

Fig. 9. Upper lateral view of a fragment, showing the curvature of the tube and the depth of the air-chambers. The obscure furrows of the crenulations at the base of the chamber of habitation are not represented. Schoharie grit. *Schoharie, N. Y.*

Fig. 10. Ventral view of an individual, showing the evident departure from a symmetrical curvature, and the large siphuncle exposed in the process of weathering. Schoharie grit. *Schoharie, N. Y.*

CYRTOCERAS METULA.

Page 360.

See Plate 47.

Fig 11. Lateral view of an individual preserving the chamber of habitation with twenty-seven attached air-chambers, showing the form and curvature of the tube, the size of the grand chamber, and the depth of the air-chambers. The obscure furrows of the crenulations are shown over a portion of the internal mould of the walls of the air-chambers. Upper Helderberg limestone. *Littleville, N. Y.*

PLATE CXII.

Orthoceras rudicula.

Page 268.

See Plate 37.

Fig. 1. A longitudinal section of the lower portion of the specimen figured on plate 37, showing the traces of an expanded siphuncle, and the organic deposit on the concave sides of the septa, represented in the figure by a darker shade. Wherever there is a separation of the air-chambers at the septa, the origin of the raised areola around the insertion of the siphuncle is seen to be due to the organic deposit on the peripheral portions of the septa.

Fig. 2. A septum of the preceding individual, showing the raised areola, with a furrowed margin, produced by the organic deposit on the concave side of the septum. The deposit is continued over nearly the whole surface of the septum, and presents little variation in its appearance. Upper Helderberg limestone. *Stafford, N. Y.*

Orthoceras sirpus.

Page 269.

Fig. 3. An individual preserving the chamber of habitation and four air-chambers, showing the depth of the chambers, and a very slight constriction of the tube at the aperture. Traces of the transverse striæ of the surface are also shown. Upper Helderberg limestone. *Columbus, O.*

Fig. 4. A specimen in the same association with the preceding, preserving the test over the entire surface, showing the regular, rounded, transverse striæ and the gradually enlarging tube.

Orthoceras varum.

Page 259.

See Plate 79.

Fig. 5. Lateral view of a specimen, showing a common appearance of the aperture, due in part to compression. The shell is naturally fusiform, and the chamber of habitation somewhat gibbous. Schoharie grit. *Schoharie, N. Y.*

Fig. 6. A septum of the preceding, showing the transverse section of the tube, and the small size and central position of the siphuncle.

Orthoceras Thoas.

Page 261.

See Plates 41, 78 B, 79, 80.

Fig. 7. A large and very much compressed individual, showing a slight curvature of the tube, with the displaced siphuncle, indicated by the raised and curved longitudinal ridge. The maceration of the shell and the destruction of the septa has probably allowed the siphuncle to fall against the interior walls of the tube, and the extreme compression has shown it in relief on the exterior. Upper Helderberg limestone. *Caledonia, N. Y.*

Fig. 8. An enlargement of the surface to three diameters, showing the sharp, continuous, longitudinal ridges, and the finer transverse striæ crenulating their summits. Upper Helderberg limestone. *Dublin, O.*

Orthoceras inoptatum.

Page 267.

See Plate 37.

Fig. 9. A fragment preserving its normal form and retaining portions of the test over the surface of the tube. Upper Helderberg limestone. *Clarence Hollow, N. Y.*

Fig. 10. The surface of the test enlarged to three diameters, showing the regular longitudinal striæ and the more irregular transverse striæ, with finer intermediate lines of growth.

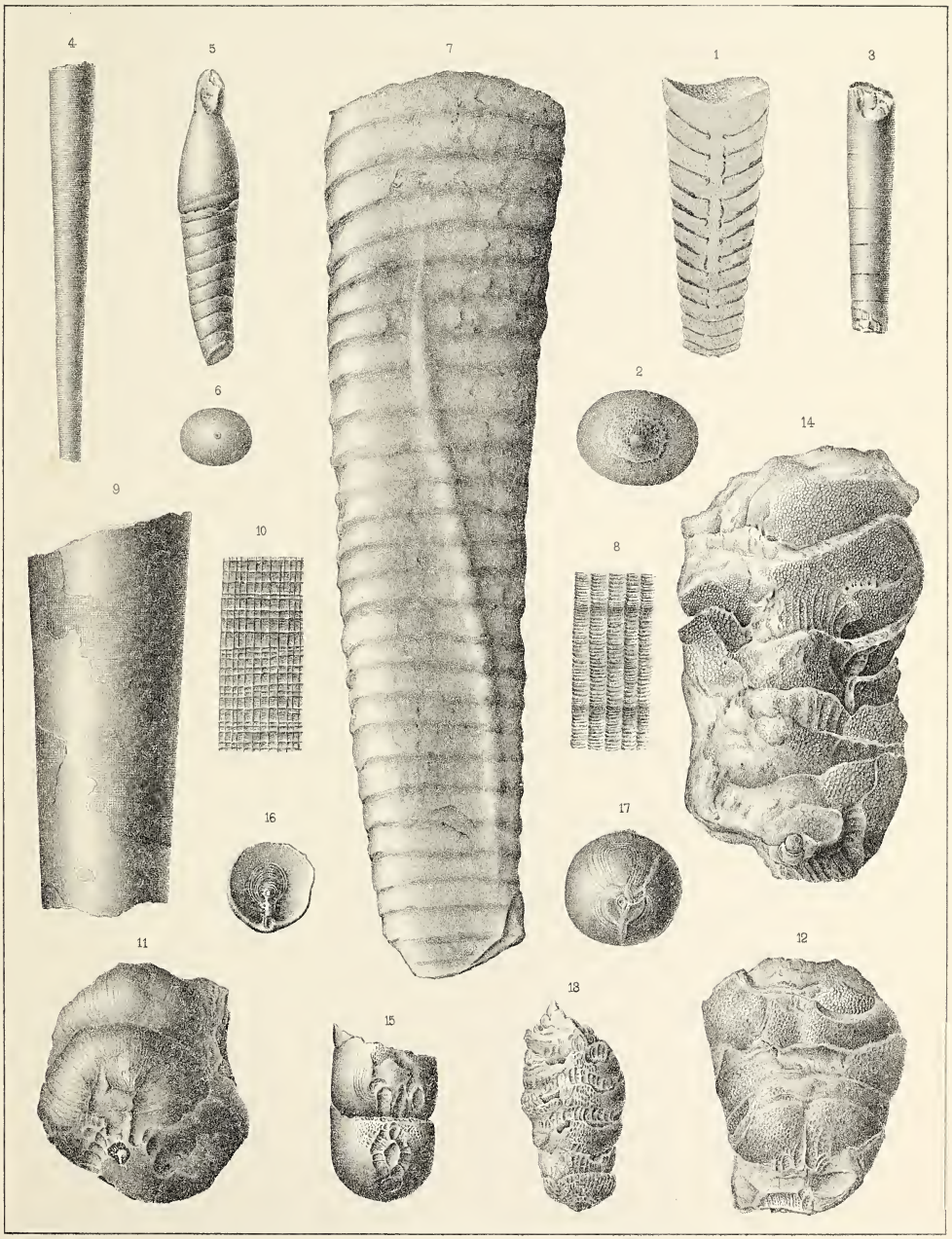
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PLATE CXII.—*Continued.*

Orthoceras oppletum.

Page 248.

See Plate 81.

Fig. 11. An oblique view of two air-chambers, showing the raised areola around the siphuncle, with the furrows at its margin, produced by the solution of the organic deposit, and also the striated surface of the septa. Schoharie grit. *Albany county, N. Y.*

Orthoceras luxum.

Page 244.

See Plates 35, 76, 77, 78, 78 B, 81.

Fig. 12. A fragment embracing several air-chambers, which have been nearly filled with organic deposit. The greater portion of the specimen shows the pits left by the solution of the material of the deposit, but in the last air-chamber the deposit itself is preserved, as indicated by the small, globular masses filling the cavity of the chamber. Schoharie grit. *Albany county, N. Y.*

Fig. 13. A weathered fragment, which preserves the furrowed cylinder around the siphuncle, and the pits, with smaller furrows on the septa, as produced by the organic deposit. Schoharie grit. *Schoharie, N. Y.*

Fig. 14. An enlargement of a fragment to two diameters, showing the characters of the organic deposit more in detail than is shown in the preceding illustrations. The cylinder of the elevated areola around the siphuncle, may be traced by the irregular longitudinal furrows, which are a distinguishing feature of the areola, as it becomes more prominent toward the apex of the tube, due to the increase in the amount of the deposit. The small pits formed by the solution of the deposit are continued over the entire interior of the air-chambers, indicating its extent and the nearly complete obliteration of the cavities of the air-chambers. Schoharie grit. *Schoharie, N. Y.*

Orthoceras pravum.

Page 255.

See Plates 35, 36, 81.

Fig. 15. Ventral view of two air-chambers, showing the obscuration of the ornamentation on the septa, as represented in fig. 17, by an organic deposit around the margins of the areola and the ovate, lateral expansion, extending over the ventral walls of the air-chambers. On one of the chambers are shown the remains of the concentric striæ surrounding the areolar marking. The organic deposit consists of coarse, globular masses and a finer deposit over the walls of the air-chambers. These features are indicated, as in the specimens of *O. luxum* here illustrated, by the furrows and small pits made in the foreign matter, filling the cavities of the chambers by the solution of the calcareous deposit.

Fig. 16. The concave side of a septum, showing the lamellose-striate areola around the siphuncle, and its extension to the ventral side. Schoharie grit. *Schoharie, N. Y.*

Fig. 17. The convex side of a septum, as shown in a well-preserved fragment. The siphuncle is represented as surrounded by the raised areola, with its lamellose-striate margin and the expansion extending over the septa and along the ventral walls of the air-chambers. This ornamentation of the septa is conspicuously different from that shown in *O. luxum*, and is probably not due to an organic deposit, but to markings made by the mantle of the mollusk. Schoharie grit. *Albany county, N. Y.*

PLATE CXIII.

Bactrites clavus.

Page 316.

See Plate 84.

Fig. 1. Ventral (?) view of an individual, preserving a portion of the chamber of habitation and twenty-five air-chambers, showing the form of the shell, the "dorsal lobe" and the curvature of the sutures. The greater portion of the shell has been filled and replaced by iron pyrites, which has formed an irregular mass at the upper extremity of the chamber of habitation. The apical air-chambers have not been filled with this mineral, and are macerated and disturbed by compression. Marcellus shale. *Schoharie, N. Y.*

Fig. 2 *id.* An enlargement of five air-chambers, showing the different aspects of the "dorsal lobe," as produced by the exfoliation of the test. In no case is it a sinus in the septal margins, but is a hiatus in the walls of the internal mould of the air-chambers, from the contact of the siphuncular tube with the inner surface of the test.

Fig. 3 *id.* Lateral view of three air-chambers, showing the curvature of the sutures over the lateral face of the tube, and the concavity of the septa in a dorso-ventral direction. The tube of the siphuncle is slightly projecting from the lower septum, and the septa are somewhat advanced on this side.

Fig. 4 *id* Dorsal view of the same, showing the slight longitudinal carina along the walls of the air-chambers and the concavity of the septa in a lateral direction.

Fig. 5 *id.* A septum showing the transverse section of the tube, and the size and position of the siphuncle.

Orthoceras scintilla.

Page 293.

See Plate 84.

Fig. 6. A specimen, natural size, showing the form of the shell and the depth of the air-chambers. From the shales of the Hamilton group. *Pratt's Falls, Onondaga county, N. Y.*

Fig. 7. An enlargement of a longitudinal section of three air-chambers, showing the concavity of the septa and the large central siphuncle, without any expansions of its tube or circumposed organic deposit.

Fig. 8. A similar enlargement of another fragment, showing the expansion of the siphuncular tube, principally at one side.

Fig. 9. Another fragment in which the siphuncle is equally expanded in the anterior portion of each air-chamber.

Fig. 10. An enlargement of the lower septum of fig. 7, showing a small concentric areola around the insertion of the siphuncle.

Fig. 11. A septum corresponding to fig. 8, showing the central position of the siphuncle at its insertion in the septum, and the excentric areola from the asymmetrical expansion of the tube in the cavity of the preceding air-chamber.

Fig. 12. A septum of specimen fig. 9, with a large central areola around the insertion of the siphuncle, corresponding to the great expansion of the tube in the air-chambers.

Orthoceras crotalum.

Page 296.

See Plates 42, 82.

Fig. 13. The apical portion of a small individual enlarged three diameters, preserving the initial extremity, and showing the umbilical cicatrice at the apex, the ornamentation of the test, and the depth of the air-chambers. The first air-chamber is seen to be much deeper than those succeeding. Hamilton group. *Pratt's Falls, N. Y.*

Fig. 13 *a.* The initial extremity of the preceding, further enlarged, to show the characters of the umbilical cicatrice more in detail.

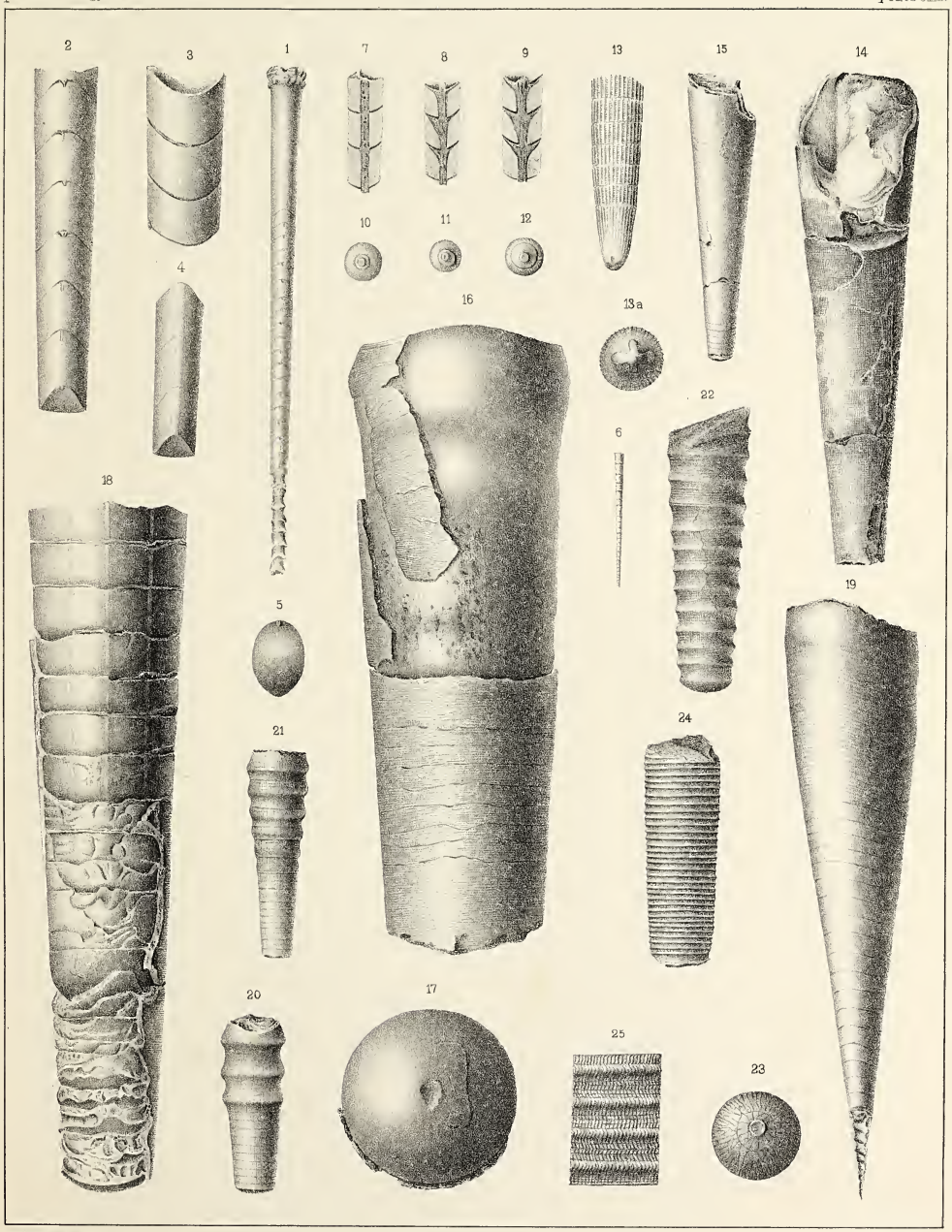
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PLATE CXIII—*Continued.*

Orthoceras textum.

Page 285.

Fig. 14. An individual showing the form of the shell and the character of the surface-markings, which are preserved over the entire exterior of the tube. Limestone of the age of the Hamilton proup. *Falls of the Ohio, near Louisville, Ky.*

Orthoceras tenere.

Page 285.

Fig. 15. An individual preserving several air-chambers near the apex, and showing the form of the tube. This specimen and the preceding of *O. textum* have become silicified, and the internal characters of the septa and siphuncle are obliterated. From limestone of the age of the Hamilton group. *Falls of the Ohio, near Louisville, Ky.*

Orthoceras fustis.

Page 281.

See Plate 83.

Fig. 16. The chamber of habitation entire, with several attached air-chambers. The septate portion is covered with the test and shows the surface characters. The chamber of habitation retains fragments of the test and shows the internal mould, which is marked by a decided constriction of the tube near the aperture, and a more gentle constriction near the base of the chamber. The aperture is entire, and a small fragment of the test presents its natural acute margin. Goniatite limestone. *Schoharie, N. Y.*

Fig. 17. A septum of the preceding, showing the central position of the siphuncle.

Orthoceras Marcellense.

Page 278.

See Plates 38, 83.

Fig. 18. A fragment showing the internal mould of the air-chambers and the characters of the organic deposit. The larger extremity preserves three longitudinal carinæ, of which the central one is stronger, and marks the ventral side of the tube. Proceeding in the direction of the apex, the organic deposit is first exhibited as small, irregular masses of calcareous matter, arranged somewhat symmetrically in regard to the ventral line. It increases in amount and complexity, until, at the smaller extremity, the cavities of the air-chambers are nearly filled with the deposit. Goniatite limestone. *Manlius, N. Y.*

Orthoceras cochleatum.

Page 308.

Fig. 19. An individual nearly entire, showing the form of the tube and the curvature and obliquity of the septal sutures. The chamber of habitation shows a slight constriction of the tube near the aperture, with a contraction at the aperture, and preserves traces of transverse lamellose surface-markings. Upper Chemung group. *Warren, Pa.*

Orthoceras bipartitum.

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Fig. 20. A small fragment preserving a portion of the grand chamber, with ten attached air-chambers, showing the prominent annulations on the chamber of habitation, and their absence over the septate portion. The internal mould preserves traces of sharp longitudinal striæ and transverse lines of growth.

PLATE CXIII—*Continued.*

Fig. 21. A fragment of another individual showing nearly the same characters as the preceding. In this example the air-chambers include several annulations, and are much deeper than in the smooth portion of the tube.

The specimens of this species here figured are from the sandstones of the Upper Chemung group, at *Warren, Pa.*

Orthoceras cælamen.

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See Plates 42, 43, 82.

Fig. 22. A fragment preserving portions of the test, and showing the natural form of the tube and characters of the annulations.

Fig. 23. A septum of another individual enlarged two diameters, showing the transverse section of the tube and the position of the siphuncle, with the small raised areola around its insertion, and the radiating vascular markings extending to the margin of the septum. Hamilton group. *Moravia, near Cayuga lake, N. Y.*

Orthoceras lima.

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Fig. 24. A fragment showing the gradually enlarging tube, and the numerous sharp annulations ornamenting its surface. Hamilton group. *Cazenovia, N. Y.*

Fig. 25. An enlargement of a portion of the surface of the preceding, showing the character of the annulations and the longitudinal striæ, interrupted by the lines of growth between the annulations.

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